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AND THE JOHNS HOPKINS INSTITUTE OF THE HISTORY OF MEDICINE

Editor—HENRY E. SIGERIST
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FRIEDRICH ERISMANN
1842-1915

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FRIEDRICH ERISMANN

THE DAWN OF RUSSIAN HYGIENE AND PUBLIC HEALTH

N. A. SEMASHKO *

The development of hygiene and public health in Russia in the second half of the 19th century or, more accurately, at the time of Erismann offers not only historical interest. Erismann left an indelible mark on the evolution of hygiene. One may say that a number of fundamental propositions put forth by Erismann in the science and practice of hygiene remain unshakeable even in our time. But more than this: only under Soviet conditions was it possible to put into practice what Erismann had taught or what he had visualized. Many propositions that he had defended during his life time have not lost their significance even today. Some views against which Erismann had justly voiced strong objections are unfortunately still current among hygienists. This is why a study of the period of Erismann, quite apart from his superior personality, has present-day significance and carries a lesson for our own time.

Friedrich Erismann came to Russia from Switzerland in 1869. This was the time of the " great reforms," of the establishment of Zemstvo rural medicine. He began his activities in Petersburg as a simple eye-doctor. It is remarkable and instructive to see, however, that he did not limit him-

* Translated by Henry E. Sigerist from Советское Здравоохранение, 1944, No. 4-5, pp. 26-32.

self to his practice but plunged into problems concerning prevention of diseases of the eyes, in particular the prevention of nearsightedness among school children. The work on this subject was one of the first tasks that he carried through in Russia; and in it he already anticipated the need for a hygienic school desk which later became known under the designation "the Erismann school desk" and which has been used in schools ever since. Having had a taste of preventive and social-hygienic work, Erismann in Petersburg already resolutely entered the field of hygiene and at that time he wrote a number of papers on sanitary inspection of the life and condition of the Petersburg poor, on inspection of over-night shelters etc. As early as that time, Erismann appeared as a broad public-spirited hygienist.

It was natural that when the Sanitary Commission of the Moscow Provincial Zemstvo decided to have sanitary inspection carried out in the factories and mills of the Moscow Province, everybody looked to Erismann. His name occurred to all as that of the most desirable candidate who would be capable of coping with the enormous task. In 1879, more than 65 years ago, Erismann went to Moscow, and to him this was the beginning of a period of manifold, intensive and unusually fruitful activities. He remained a resident of Moscow as long as he stayed in Russia.

Erismann splendidly fulfilled the task entrusted to him of inspecting the factories and mills of the Moscow Province. With a group of public health physicians he inspected them in the course of six years. The inspection included 1080 industrial establishments employing 114,000 workers. The report written on each one was in sections: history of the industrial undertaking, present situation, composition of the workers, their connections with the rural population [a problem which at that time had much political significance in connection with the controversies with the Populists about the development of capitalism in Russia and the origin of the proletariat], conditions of hire (length of the working days, wages), living conditions, nutrition etc. And again it is significant and instructive to see that Erismann did not limit himself to mere fact-finding, but endeavored to devise practical means for improving the life of the workers, although he recognized very clearly how utterly difficult it would be to provide any much-needed measures in view of the all-powerful and irresistible exploitation of labor at that time. "Up to now," he wrote, "factories and mills appear to be the exclusive domain of the ruling class where the will of one man rules supreme who does not recognize within the territory of his establishment any laws and regulations except those that he himself orders."

As a result of the inspection, 17 printed pamphlets (of 380 pages with plans and sketches) were published, 6 of which (with 130 pages) had been written by Erismann personally. In these reports he pointed out the tasks of the Zemstvo with respect to the supervision and control of sanitary conditions of factories and plants, of the labor conditions of workers and of workers' settlements. On the methodical side, these inspections appear as a model for this kind of work to the present day.

Erismann thus combined scientific research and practical work, and it is not astonishing that when in 1884, positions of public health physicians were established for the first time in the Moscow Province, Erismann was one of the first to be appointed.

This period of his life was extremely important for his future scientific career. Like Antaeus of old, he touched the earth, the Russian earth, and he knew the sanitary condition of Russia at that time. And this determined the general character of his scientific activity. Indeed, he, an emigrant from Switzerland and a Swiss citizen, was so fond of our country, that he declined an advantageous offer to occupy a chair in "civilized" Austria and at the VIIIth International Congress of Demography held in Budapest in 1886, when all the delegates took pains to please their hosts by addressing them in broken Hungarian, he made a passionate speech conveying the greetings of the Russian doctors and made it in fluent Russian.

In 1882 Erismann was invited to assume the duties of Professor of Hygiene in the Medical Faculty of the Moscow State University—the first independent professorial chair of hygiene. The new department was assigned a small room in the university building, but Erismann was helped by the Zemstvo authority. He built a laboratory in this room for the instruction of students and he even trained cadres of public health physicians.

Finally, Erismann's vision was realized: in 1890 he opened the Institute of Hygiene, built by him on the Deviche Polye. With greatest care and love he had worked out the details of the plan for the building, the arrangement of the laboratories, of the lecture halls, of the study rooms. He personally planted trees around the Institute, directed the planting of lawn around the clinics of Deviche Polye. The beautiful oak and linden trees which today are in front of the building of the Institute of Hygiene were actually planted by its founder Erismann's own hands.

In the beginning, the Institute building had two floors. Two additional floors were added under the Soviet regime in 1936. At that time the

lecture halls were thoroughly re-equipped, a new one was built and the whole building was greatly improved.

In the Institute of Hygiene the most brilliant period of Erismann's educational, scientific, and practical activities began. Seen from the perspective of history, Erismann must be given great credit for having sharply defined the concept of hygiene. A discussion that is instructive even for the present time developed on this subject between two leaders of hygienic thought, the Petersburg professor Dobroslavin and the Moscow professor Erismann.

Dobroslavin taught: "For the ideally complete training of a specialist in hygiene it is necessary to have him study so many subjects that it is impossible to combine all this with the study of the equally large number of subjects in the field of medical knowledge" . . . "It is true that the physician who has duly completed his training may become the best hygienist, but from this it does not follow that people who have not had a preliminary medical training may not become hygienists."

To this Erismann replied: "If we recognize as hygienists those physicists and chemists who occasionally busy themselves among other things with problems of the science of hygiene, then we completely violate the principle that we have made the foundation of all hygienic investigations and of hygiene in general, namely the correlation between the phenomena studied and the health of man. For it is hardly possible to evaluate the influence of any external factor on the human organism without having had training in medicine" . . . "The divorcing of hygiene from its starting point, namely the human organism, or the destruction of its organic link with medicine may have exceedingly sad consequences for a further sound development of scientific hygiene."

This controversy between Dobroslavin and Erismann had great significance in the matter of principles and has not lost any of its actuality to the present time. In spite of the fact that the practice of public health has fully confirmed Erismann's point of view, attempts are encountered over and over again to limit the field of hygiene to technical measures of sanitation. It goes without saying that the technique of sanitation has enormous significance for the provision of sanitary and therefore also hygienic measures. The public health physician must be familiar with the basic techniques of sanitation. But hygiene is the science of the health of man and in order to be a hygienist it is necessary to know the physiology and pathology of man. The hygienist makes use of the progress of sanitary techniques to improve the health conditions of society and he sets the

problems for sanitary techniques. In the same way, the epidemiologist must be familiar with the laboratory, but laboratory technician and epidemiologist are not the same. The epidemiologist makes use of laboratory methods of research to combat epidemics.

The substitution of sanitary techniques for hygiene defended even now by some hygienists hurts the correct presentation of hygiene as a subject of instruction. That many students (really, many) consider hygiene an "unnecessary," "dry," "dead," "luxury" science—is it not because it is often presented divorced from living man, from the physiology and pathology of man?

But Erismann defended not only these quite correct and fruitful positions in the conception of the nature and tasks of hygiene. An expert in laboratory matters, he protested against conceiving the tasks of hygiene as a science and practical activity in a narrow laboratory sense. "You declare," he said, "that hygiene is not the science of the people's health and that it must apply itself only to the elaboration of its problems within the walls of the laboratory; and in front of you stands the ghost of a science for which it is not worthwhile to labor. You see that in such a case even the experimental elaboration of problems of hygiene loses a great deal of its attractiveness because it may claim originality and independence only insofar as it applies itself to the investigation of those factors which in some way or other influence the health of man as a social unit."

Unfortunately, the narrow laboratory approach has by no means been overcome among our hygienists. And this attitude is also accurately reflected in public health practice and in the teaching of hygiene in the medical schools; this is what makes the teaching of the subject dry. Knowledge of the methods of hygienic investigation is imperative for the physician.

Erismann understood the social-hygienic character of his discipline. In the first manual on hygiene (1872-1877) he already wrote: "The immediate goal of hygiene—to investigate the influence on man of all phenomena of nature to the action of which he is subjected, and furthermore the influence of the artificial environment in which he lives as a result of his social condition, and finally to find the means of mitigating the action on the organism of all harmful conditions from the part of nature and society." . . . "Only those measures can be beneficial that improve the health conditions of whole groups of people or of the population altogether." And this social-hygienic outlook he carried on steadily in his scientific and in his practical activities.

The significance of Erismann as a scientist and teacher was determined by this correct understanding of the nature, targets and tasks of hygiene. He was not an academic orator; he spoke with soft voice and very quickly. But the content of his lectures was so interesting that crowding in the front rows of the lecture hall, we endeavored not to miss one of his words. His lecture hall was packed full of students. In his lectures and in his practical courses—the program of which has not lost any of its significance even today—he never lost himself in trifles, never burdened the students' mind with unnecessary details. In the introduction to his textbook of hygiene he wrote: " To overload a textbook with a mass of materials which in themselves may be extremely interesting but are not necessary for the understanding of the main subject or are even not established beyond any doubt, does not make sense and must even be considered harmful." Indeed, this policy of Erismann also has not lost any of its significance, and our textbook writers should remember it.

The activity of Erismann as an academic teacher was remarkable also for the fact that in accordance with his concept of the tasks of hygiene he taught the students not to separate theory from practice. In connection with his department he created a famous public health office, the laboratory of which took care of the current needs of the city. He organized its work so as to make it, in his own words, " a center not only for the control but also for the elaboration of suitable legislative measures. The reports of this public health office present considerable interest to the present day, scientifically and methodically.

In establishing a public health office in connection with his department, Erismann did what to the present day many of our departments of hygiene are still endeavoring to do.

As was said before, for Erismann hygiene was social hygiene, and he did not conceal his views either as president of the Pirogov Society of Physicians, or as president of the Society of Hygiene, or in his verbal or printed statements. " There is nothing in the nature of man that would force us to accept disease as man's inevitable destiny." " We find that the mortality of man is most intimately related with the imperfection of our mode of living," he said using Aesopian language to avoid censorship, as if he had anticipated the appearance of the delirious ideas of the race-theorists. " How could a prisoner in jail protect himself against phthisis when the prison authorities feed him badly and keep him in a damp cell without air and light."

When in 1887 the so-called " Botkin " tsarist commission came forth

with proposals it had worked out " on the problem of reducing the mortality in Russia," Erismann together with Dr. Osipov, the founder of the Moscow public health organization, subjected the bureaucratic proposals of the Commission to annihilating criticism. " We do not know of any such means, of any special public health panaceas which all by themselves, without conditions favorable to cultural progress or even in spite of them, could at once and markedly improve the people's health in the country, all the more in so vast and so sparsely populated a country as Russia with its extremely low standard of living, its slowly developing productivity, its strongly suppressed population etc. etc." " Poverty is the most universal scourge of the Russian people and however important these or any other public health influences on the health of our population may be, yet they are very often suppressed by the still greater influence of a powerful economic factor." " Health of the individual person presents itself merely as a part of the health of society," Erismann wrote later.

For a long time already the tsarist government had looked askance at the activity of this dangerous professsor, but it could not punish him as it usually did individuals who seemed undesirable, namely with arrest and the ensuing consequences. Its hands were tied because Erismann was a Swiss citizen and could not be arrested.

Finally, a reason for sanction was found. Great student riots took place in 1895-1896. In the years of tsarist reaction, the student body was a very sensitive barometer of the growing popular discontent. The gendarmerie punished the students mercilessly, arresting them in masses. The writer of these lines was arrested also. Then a group of progressive Moscow professors (49 men) under the leadership of Korsakov and Erismann appealed first to Prince Sergei Alexandrovich who was Governor-General at that time, then (40 men) to the Minister of " Public Education," Count Delyanov, with a petition on " alleviating the lot of the arrested."

The petition was written in very moderate terms; the signers interceded only for those " arrested for a misunderstanding " but not for those " having committed a political offense." But even this was enough to keep the arrested students sitting in jail and to bring punishment to the professors who signed the petition. A number of professors and among the first Erismann, were deprived of their chairs. This happened in 1896. At that time, Erismann was on a vacation in Switzerland. When he heard of the sanction imposed upon him by the tsarist government, he never returned to Russia.

It was a sad experience for Erismann to have been torn away from his

work in Russia, a country that he passionately loved and of which he was an ardent patriot. The touching letters that he wrote to Russian friends are a testimony of it, letters that even today one cannot read without being moved.

" Slowly but threateningly," he wrote from Switzerland to a member of the Society of Hygiene, " the storm-clouds gathered over my head in the course of the last years; but there was nothing I could do against the approaching storm since the only means I had available—my honorable intentions and the conscientious fulfilment of my duties—could not appease the elemental forces. The storm broke out at a totally unexpected moment. It brought me down and swept me off from the face of the Russian earth, tore me out with the root from a position which once seemed indestructible and threw me down on the shore of an ocean, deprived of all that was dear to me, academic and social activities, friends and comrades. All my plans for the future, all that I was entitled to expect and demand from this future was in the twinkling of an eye turned into mere soap bubbles." " It often seems to me that my life is finished, and to a certain degree this is undoubtedly the case because one can love only once the way I loved my activities in Moscow. In any case I am obliged to take my leave from Moscow, and at the same time from Russia in general, forever, as it will never be possible to resume my former activities there."

But for Erismann the cause involved was far more important than his own personal experiences, sad as they were, and he concluded a letter with the courageous exhortation: " From the bottom of my heart I wish that this Society at whose birth I had the pleasure to assist and that was dear to me from its first steps, may continue to flourish, that more and more it may attract the attention of intelligent people and that its voice may be heard more and more frequently wherever the improvement of the sanitary conditions of the population is being discussed. This will be a well justified and deserved success. And so: go ahead, fearless and full of confidence."

To Zemstvo doctors of the Moscow Province he wrote: " They have treated me badly, without justification. Of course, I am not the only one; who has not had such an experience? But for me it was probably more painful than for many others because I am not a young man who still can count on the future. At my age it is always difficult to begin a new life. It is true that I still feel strong and full of energy, but I do not know whether external circumstances will be sufficiently favorable. At any rate, I shall always remember Russia in profound gratitude—I am greatly

indebted to her. And, of course, I shall never forget either those general problems that filled us with so much enthusiasm at our conventions, or the dear comrades with whom I had the good fortune to work. Never shall I lose touch with the organization of Zemstvo medicine, so dear to me and close to my heart."

The severe repressions did not shatter the democratic convictions of Erismann. In Zurich where he had settled down, he joined the Social-Democratic Party, was elected a member of the City Council and developed an energetic activity to improve the living conditions of the Swiss working class. His home was constantly visited by Russian physicians who came to seek advice from their old teacher.

Erismann died at the age of 73 in 1915. One of his disciples and co-workers, Professor P. N. Diatroptov, very correctly wrote in an obituary: " They erased Erismann from Russian life but nobody can erase his name from the history of Russian social medicine and his memory will never die."

THE PHILOSOPHICAL BACKGROUND OF MAGENDIE'S PHYSIOLOGY

OWSEI TEMKIN

Dr. Olmsted has published a biography of François Magendie presenting a lucid and instructive account of the life and work of this "pioneer in experimental physiology and scientific medicine in XIX century France."[1] He follows him from his birth in 1783 through his scientific and medical career in Paris until the year 1855 when he died much honored, though not equally well liked. In the course of this narrative Magendie's work, above all his physiological experiments, is discussed in detail and with an instructiveness which only a fellow physiologist could supply. Magendie's achievements as well as his failures become understandable. The famous controversy regarding priority in what is commonly known as the law of Bell and Magendie is decided in Magendie's favor on the basis of a painstaking investigation. Moreover, Magendie the experimental pharmacologist, hygienist and medical practitioner is not neglected. Altogether, it can be said that the picture of the man and of his work is drawn in a manner which makes this book a standard biography.

Just because of its biographical thoroughness, Dr. Olmsted's present volume invites a question of a more general nature. In how far was Magendie, whose personal character and scientific aim are so clearly delineated, dependent upon a philosophical current of his time, and in how far did he himself give a new direction to this current? It is to this question that a tentative answer will be proposed in the following pages.[2]

[1] J. M. D. Olmsted, *François Magendie, pioneer in experimental physiology and scientific medicine in XIX century France*. With a preface by John F. Fulton. New York: Schuman's, 1944. xvi + 290 pp., illustrated. $5.00.

[2] The complexity of the subject and the present impossibility of gaining access to much important source material make it impossible for me to attempt more than a preliminary answer. Nevertheless I think the indications which suggested themselves to me worth publishing if only as the tentative beginning of a more comprehensive scheme. In course of time I intend to analyze the relation between physiology and philosophy in the 19th century and such future work may offer the opportunity of correcting or amplifying what is said here.

I wish to take this opportunity to thank Dr. Erwin H. Ackerknecht for several bibliographical suggestions, particularly the book by Cailliet and the article of v. Hayek (see below notes 79 and 113). These suggestions were made while Dr. Ackerknecht was still on the staff of the Johns Hopkins Institute of the History of Medicine, when I frequently had stimulating talks with him concerning various phases of my above mentioned project.

1.

At first glance an investigation into Magendie's philosophical background does not seem promising. The man who compared himself to a scavenger in the realm of science [3] and who led a lifelong fight against hypotheses and systems might be expected to lack all interest in philosophical questions. Indeed, if philosophy is limited to some traditional metaphysical problems like the existence of God and the immortality of the soul, Magendie's occasional remarks are vague and disconnected from his main work. In his "Précis élémentaire de physiologie" which appeared in 1816-1817,[4] Magendie wrote:

> The human intellect consists of phenomena so different from all others in nature, that they are referred to a particular being, regarded as an emanation from the Divinity.
>
> The belief in this being is too consolatory for the physiologist to doubt its existence; but the strictness of language and logic at present observed in physiology requires the human intellect to be treated as the result of the action of an organ.[5]

A few pages later he said:

> Whatever may be the number and diversity of the phenomena which belong to the human intellect, however different they may appear from all the other phenomena of life, and however evidently they may be dependent upon the soul, it is necessary to consider them as the result of the action of the brain, and not in any measure to distinguish them from other phenomena which depend upon organic action.[6]

From these quotations it is clear that as a physiologist Magendie treated the human intellect as a function of the brain. This in itself is very important, but does it mean that, beyond physiology, he recognized the soul as a divine emanation? Or were these remarks meant ironically? Or were they an outgrowth of mere religious and philosophical indifference which did not think it worth while to offend publicly prevailing sentiments?

Such questions are more easily raised than answered. Besides, the impression cannot be avoided that they do not touch the core of Magen-

[3] Cf. Claude Bernard, *Leçons sur les effets des substances toxiques et médicamenteuses.* Paris, 1857, p. 12 f. Cf. also J. M. D. Olmsted, *Claude Bernard, physiologist.* New York and London: Harper and Brothers, 1938, p. 25.

[4] In the following abbreviated as "Précis." For the English quotations from this work I used the translation by J. S. Forsyth which appeared under the title of "*An elementary summary of physiology. By F. Magendie,*" London, 1825. This will be abbreviated by "Summary."

[5] *Summary* I, p. 104 f. (cf. *Précis* I, p. 154).

[6] *Summary* I, p. 115 (cf. *Précis* I, p. 170).

die's interests which seem to have been absorbed by his scientific work. During his last fatal illness, he remarked to a colleague: "You see me here completing my experiments; never has the science to which I have devoted all my energies appeared to me surrounded by more grandeur. The forces of life, so marvellously integrated, awaken to make each of us a passing instrument which upon extinction is regenerated. At least I have been able, during my limited course, to place a few landmarks on the road which leads to Truth, the only power to which I have subordinated my reason." [7] This solemn remark reveals Magendie's impersonal concept of science, but it also suggests that he felt no need to step beyond the boundaries of medicine and physiology.

It is, therefore, all the more interesting to see that Magendie, at one time in his life at least, took an interest in philosophical literature. The title-page of his doctoral thesis [8] carries the following motto:

> Il faut ménager le temps de ses lecteurs,
> jamais on ne saurait en être trop avare.[9]
> DESTULT [*sic*] TRACI, *Elémens d'idéologie.*

This sentence is taken from the second part of the "Éléments d'idéologie" by Destutt de Tracy (1754-1836),[10] the French philosopher, who used the term "idéologie" as designating the science of ideas which was to replace the older metaphysical systems. Destutt de Tracy was one of the leaders of the "idéologues" who had aroused Napoleon's suspicious contempt.[11] The other head of this school was the physician Cabanis (1757-1808), whose fame chiefly rests on his "Rapports du physique et du moral de l'homme," part of which was published in 1798-99, while the first complete edition appeared in 1802. These two men stood in the philosophical center of a large but loosely connected group of intellectuals who, with more or

[7] P. Flourens, *Éloge historique de François Magendie.* Paris, 1858, p. 57.

[8] *Essai sur les usages du voile du palais, avec quelques propositions sur la fracture du cartilage des côtes.* Paris, 1808.

[9] For translation cf. Olmsted, *Magendie*, p. 18.

[10] *Élémens d'idéologie. Seconde partie. Grammaire.* Par le Cen. Destutt-Tracy. Paris, an XI = 1803, p. x. A second edition of the first part with the sub-title "*Idéologie proprement dite*" appeared in 1804, while the third part, "*Logique*," was published in 1805. The fourth and fifth parts, called "*Traité de la volonté et de ses effets*," I was able to use in the second edition of 1818.

Since Magendie's thesis dwelt on phonetical questions, this may have conceivably led him to consult the second part of Destutt de Tracy's work which included a discussion of the origin of words. However, once attracted, his interest certainly increased as will become clear further on.

[11] Cf. Picavet, *Les idéologues*, Paris, 1891, p. 21 ff.

less accuracy, have been called idéologues. It is significant that Magendie's first publication already indicated some connection with their work.

But before this lead is followed further, another circumstance has to be mentioned which points to a connection between Magendie's physiological work and some broad principles guiding it. In 1809, the year following his graduation, Magendie brought out "Quelques idées générales sur les phénomènes particuliers aux corps vivans." [12] In a chapter headed "Revolt from Bichat 1809," Dr. Olmsted [13] has analyzed the salient points of this essay against the background of a résumé of Bichat's doctrines. He has found that it already announces "the general principles to which he [i. e. Magendie] was to adhere for the whole of his career." And Dr. Olmsted adds that "the paper is unique" among Magendie's publications since it does not describe any experimental or other observations.[14] In other words, Magendie, outstanding throughout his life for his "distrust of theory and firm faith in experiment," [15] conceived his program largely on theoretical grounds.

It, therefore, seems worth while asking whether such theoretical opinions as underlined his physiological work were related to some current philosophical thought of his time, more specifically to the "idéologie" with which he had already been acquainted as a medical student.

2.

Physiology is confronted with philosophical issues on two sides. At one end, so to speak, it touches upon the relationship between matter and life, while at the opposite end it meets the problem of body and mind. On both points Magendie expressed himself in no uncertain terms, so that his historical position can be fixed with some degree of certainty.

Descartes had made the human body a mere machine assigning the mind to the realm of pure spiritual existence. The idéologues, on the other hand, made the mind a mere function of the body. It was Destutt de Tracy who said: "One has but an incomplete knowledge of an animal if one does not know its intellectual faculties. Ideology is a part of zoology, and it is particularly in man that this part is important and deserves to be examined thoroughly." [16] Small wonder then that in the early decades of

[12] Cf. Olmsted, *Magendie*, pp. 20 and 271. Unfortunately, I have not been able to obtain a copy of this essay.
[13] *Ibid.*, p. 19 ff.
[14] *Ibid.*, p. 34.
[15] *Ibid.*, p. 33.
[16] Destutt de Tracy, *Élémens d'idéologie*, I. p. xiii.

the 19th century Destutt de Tracy was considered the head of French materialism, and Heinrich Heine, comparing French and German philosophers, called him "the Fichte of materialism." [17]

In a passage which has remained famous, Cabanis had said: "In order to form a correct idea of the operations from which thought results, one must consider the brain as a particular organ, especially destined to produce it; just as the stomach and intestines are destined to effect digestion, the liver to filter the bile, and the parotid, maxillary and sublingual glands to prepare the salivary juices." And once again comparing the functions of stomach and brain, he had added that "the brain, in some way, digests impressions and that organically (organiquement) it effects the secretion of thought." [18] This passage became the mainstay of the popularizers of materialism in the middle of the 19th century.[19]

As has already been remarked, Magendie too had insisted that the physiologist had to treat intellectual phenomena as the result of the action of the brain just as any other phenomenon depending on organic action. Such a study, if strictly adhering to observation and avoiding any hypothetical ideas, would become purely physiological and would not belong to metaphysics exclusively.[20] And then he continued with a paragraph important enough to be cited in full:

> However this may be, the study of the intellect does not at present form an essential part of physiology; a science is specially devoted to it, I mean *ideology*. Those who wish to acquire enlarged views of this interesting subject, must consult the works of Bacon, Locke, Condillac, Cabanis, and especially the excellent work of M. Destutt Tracy, entitled *Elemens d'Ideologie*. We shall at present confine ourselves to some of the fundamental principles of this science.
>
> The innumerable phenomena which constitute the human intellect, are only modifications of the faculty of feeling. If they are attentively examined, this truth will be easily acknowledged, which is fully set forth by modern metaphysicians.[21]

Together with Destutt de Tracy, Magendie distinguishes the following

[17] H. Heine, Französische Zustände (letter of June 2, 1842), *Sämtliche Werke*, Leipzig, Reclam, 4. Bd., p. 285.

[18] P.-J.-G. Cabanis, *Rapports du physique et du moral de l'homme*. Huitième édition augmentée de notes etc. par L. Peisse. Paris, 1844, p. 137-138.

[19] Cf. *ibid.* p. 138, editor's note. Cf. also F. A. Lange, *Geschichte des Materialismus*, zweite Aufl., 2. Buch, 1. Hälfte, Leipzig u. Iserlohn, 1874, pp. 134, 152 and 288;—J. T. Merz, *A history of European thought in the nineteenth century*, vol. II, third unaltered edition, Edinburgh and London, 1928, p. 469 f.;—G. H. Lewes, *The history of philosophy from Thales to Comte*, 3rd ed., vol. II, London, 1867, p. 375.

[20] Magendie, *Summary* I, p. 115 f. (*Précis* I, p. 171).

[21] *Ibid.*, p. 116 (*Précis* I, p. 171).

" four principal modifications of the faculties of feeling ": *sensibility, memory, judgment* and " the *desires* or *will*." [22] To each of them he devotes a short section, the last one being of special interest since it contains a few remarks on the science of morals and on understanding. Happiness results from the satisfaction of our desires whereas lack of such satisfaction leads to unhappiness. " *Morals* are a science whose object is to give the best possible direction to our desires." [23] In particular, we ought to avoid hurtful things and should not desire things which we cannot attain. *Understanding* is achieved by combinations and inter-reactions of the simple faculties. It is characterized by the faculty of generalizing, viz. the creation of signs which represent ideas, thinking by means of these signs and the formation of abstract ideas. But only in a state of society is man able to develop this faculty of generalizing. Moreover, cultivation of the mind depends on ease in procuring a living and on satisfaction of all the wants of man's organization. This is the case in civilized countries, whereas in " hunting nations, in hordes of savages, the rustic slave, etc." [24] man's understanding will remain imperfect, since it must constantly be directed towards the one end of satisfying his needs.

The latter ideas are expounded at greater length in the following sections " Of Instinct and Passions " and " Of the Passions." Nature has given instinct to all animals with the twofold aim of the preservation of the individual and of the species. In man, whose instincts are " enlightened " because they are accompanied by a knowledge of the ends, two kinds can be found. The *animal instinct*, relates to his various needs from hunger, thirst, etc., down to the tendency to live in a society, whereby the path for the development of the various stages of civilization is opened. The *social instinct* is the response to new needs which arise with man's living in civilized society under conditions of freedom from want and of leisure. The sentiments that now stand in the foreground are a desire for a lively feeling of existence and the love of idleness. The former leads to an ever increasing craving for excitement, since sensations become blunted by experience, " hence the ennui which incessantly torments man when civilized and unoccupied." [25] On the other hand, " the want of lively existence is balanced by the love of repose or idleness, which acts so powerfully upon the opulent class of society. These two contradictory feelings modify each other, and from their reciprocal action arises the love of power, of consideration, fortune, etc. which afford us all the means of satisfying both." [26] The

[22] *Ibid.*, p. 116 (*Précis* I, p. 172).
[23] *Ibid.*, p. 120 (*Précis* I, p. 177).
[24] *Ibid.*, p. 121 (*Précis* I, p. 179).
[25] *Ibid.*, p. 123 (*Précis* I, p. 182).
[26] *Ibid.*

social instinct, as a " vital phenomenon " also depends on organization.[27] It is, therefore, not opposed to the animal instinct.

> The natural wants influence the social, and these in their turn modify the former; when we also recollect that age, sex, temperament, etc. forcibly alter every kind of want, we shall be able to conceive the difficulty of studying human instinct: and in fact this point of physiology is at present scarcely even roughly sketched.[28]

Passions are but extreme and exclusive forms of instinctive feelings and can, therefore, also be divided into animal and social, the latter being " merely the social wants carried to a high degree." [29] If gratification of passions leads to their appeasement, happiness may result, but if it only leads to more irritation, misfortune is bound to arise. Social wants further understanding which goes to explain the relatively high intellectual capacity of members of " the higher class of society." [30] But it is on the passions that the greatness of human actions depends, be they good or bad. " Great poets, heroes, great criminals and conquerors are empassioned men." [31]

Having reached this peak of his psychological doctrine, Magendie still does not deny its sensualistic origin. The passions are internal sensations: therefore they have no definite *seat* and Bichat was wrong when he made them reside in organic life. They result from the action of the nervous system in general and of the brain in particular: therefore they can be as little explained as any other vital actions. " One should observe, direct, calm, or extinguish them, but not explain them." [32]

Even in the discussion of sensibility, memory, judgment and will where Magendie claimed but to outline the science of ideology and indeed followed the arrangement of Destutt de Tracy, he frequently went his own way. In his views of instinct and passions he seems to be even more independent of any direct model. " Without being entirely new, the ideas

[27] *Précis* I, p. 180: " L'autre genre d'instinct nait de l'état social; sans doute il dépend de l'organisation: quel phénomène vital n'en dépend point? "

[28] *Summary* I, p. 123 (*Précis* I, p. 183).

[29] *Ibid.*, p. 125 (*Précis* I, p. 184).

[30] *Ibid.*, p. 124 (*Précis* I, p. 183: " la classe aisée de la société ").

[31] *Ibid.*, p. 125 (*Précis* I, p. 185).

[32] *Précis* I, p. 185. In a footnote (*Summary* I, p. 125), Magendie adds that " this would be the place to treat of the use of the different parts of the brain, in the understanding and instinctive faculties," if the subject were not " too conjectural or too little known to be considered in an elementary work." This might be taken as an allusion to Gall's doctrine, and it is not impossible that Magendie was interested in Gall's theory of innate instincts and passions as depending on the organization of the brain, without following him into his phrenological system.

which he sets forth concerning the instinct and the passions are for the greater part not to be found in our elementary works on physiology, and from this point of view they give a real advantage to the one under discussion." [33] This praise by a contemporary reviewer extends particularly to those parts of the "Précis" where Magendie applies these ideas to the relationship between sensations, motions, the will and instinct and passions.[34] The discussion is preceded by a distinction between the "cry or native voice" and the "acquired voice, or voice properly so called." [35] The cry is independent from man's intellectual achievements, it is a mere consequence of his organization and serves to "express our most simple instinctive wants, our natural passions." [36] It is the kind of language that evokes joy, pity, dread, etc. in others and which man possesses in common with most animals. Voice properly so called must be learned, i. e. acquired. It presupposes not only hearing and intelligence, but also a state of social existence. It is the "social voice" and speech and singing are its modifications.[37]

> Man alone is gifted with *speech*, which is the most powerful means of expression possessed by the mind; he alone also attaches a meaning to the words which he pronounces, and to the arrangement which he gives them; without his intellect he could not speak. In fact, most idiots cannot speak; they articulate sounds vaguely, which have, and can have, no signification.[38]
>
> Singing, like voice and speech, is the effect of society. It supposes an ear and understanding. It is generally employed to signify [peindre] instinctive wants, passions, different states of mind: joy, sorrow, successful or unsuccessful love, excite different kinds of song.
>
> Singing may be articulate. Then instead of expressing feelings only, it becomes the means of expressing most acts of the understanding, but particularly those which are connected with the *social* passions.[39]

As a subject which he had already approached in his doctoral thesis, the physiology of the voice was sufficiently near to Magendie to receive more than casual attention. But in principle the remarks made here could serve

[33] Review by Chamberet of the first volume of the *Précis* in: *Journal de médecine, chirurgie, pharmacie, etc.*, 1816, t. 36, p. 291.

[34] *Ibid.*, p. 291. Cf. *Summary* I, pp. 204-211 (*Précis* I, pp. 300-310).

[35] *Summary* I, p. 151 ff. (*Précis* I, p. 224 ff.).

[36] *Ibid.*, p. 152 (*Précis*, p. 225).

[37] *Ibid.*, p. 153 (*Précis*, p. 227: "la parole et le chant ne sont que des modifications de la voix sociale").

[38] *Ibid.*, p. 155 f. (*Précis*, p. 230). The statement concerning idiots is accompanied by a reference to "Pinel, *Traité de la Manie*, pag. 167."

[39] *Summary* I, p. 157 (*Précis* I, p. 232 f.).

as paradigms for more general considerations. All those movements which are called " gestures " (gestes) are intended to express our intellectual and instinctive acts and can be divided into those intimately connected with organization which " are to the motions, what cry is to the voice " [40] and those that " may be termed *acquired or social gestures*, from their analogy to acquired voice." [41] Just as a person, born deaf, will not develop a social voice, so a person blind from birth will not acquire social gestures.[42]

Magendie now raises the question in how far our attitudes and motions are dependent upon our will. Willful actions presuppose an idea of the motion to be produced. Whereas the will can determine what motion should result, it cannot direct the contractions of the individual muscles which make the motion possible; this part is purely instinctive. Magendie cites Legallois as having supplied the experimental basis for this contention.

> His [i. e. Legallois] experiments have demonstrated that the will is more particularly seated in the cerebrum and cerebellum. The direct cause of motion appears, on the contrary, seated in the spinal marrow. If the spinal marrow is separated from the rest of the brain by a section behind the occipital bone, the will is prevented from determining and directing the motions; but the latter are not the less produced; it is true that as soon as the separation is made they become very irregular in extent, rapidity, duration, direction, etc.[43]

This demonstration of the essential rôle which instinct plays even in voluntary motions and attitudes now closes the circle. Not only do voice and gestures express instinctive feelings and passions but motions are also dependent upon " natural passions and all the instinctive phenomena which are developed in the social state." [44] Passions can excite and strengthen motions, and they can also make them impossible: " hence the art of pantomime is employed with success in painting violent passions." [45]

It might not be impossible to annotate this outline with various references showing to what authors Magendie could have been indebted. More important than such details, however, is the general observation that at his time it was almost customary among medical scientists to deal with psychological and sociological questions. And here again, the heirs of the philosophers of the 18th century had set the tone. Cabanis' " Rapports " had tried to prove that man's body and mind should be seen from a common angle.[46] Destutt de Tracy had declared that the study of man's mind was a province

[40] *Ibid.*, p. 205 (*Précis*, p. 302).
[41] *Ibid.*, p. 206 (*Précis*, p. 302).
[42] *Ibid.*, p. 206 (*Précis*, p. 302).
[43] *Ibid.*, p. 209 (*Précis*, p. 306).
[44] *Ibid.*, p. 210 (*Précis*, p. 308).
[45] *Ibid.*
[46] Cf. Lewes, *op. cit.*, p. 368 ff.

of zoology.[47] Even Bichat, though somewhat reluctant to accept the radicalism to which the idéologues had pushed Condillac's doctrine,[48] paid much attention to the interdependence between the functions of man's organism and the society in which he lived. Bichat, just as Cabanis' friend Alibert (1768-1837) and others who had lived through the turmoil of the French revolution, studied the effects of political passions on human health,[49] and in the early decades of the 19th century the physiological aspects of passions became a favorite theme among French medical authors,[50] culminating in Alibert's treatise of 1825.[51] Obviously, therefore, Magendie did nothing unusual in projecting physiology into the realm of sociology. If anything, Magendie was even relatively restrained in this respect, for he wished to exclude from his work what he did not consider pertinent to physiology and medicine, as for instance the origin of language and the invention of the alphabet. "This knowledge," he said, "would undoubtedly be curious and useful, but it is not indispensable, and besides does not belong to physiology." [52]

3.

As far as the relationship between body and mind is concerned, Magendie not only accepted the basic doctrines of the idéologues but openly acknowledged his indebtedness to them. Such an acknowledgment will not be found regarding the way Magendie visualized the relationship of matter and life. Nevertheless, a parallel can be perceived which goes far to explain Magendie's vitalistic attitude.

Descartes' vision of the animal organism as a machine acting according to mechanical laws had deeply influenced philosophers as well as physicians of the 17th century. A reaction had set in during the 18th century under the influence of Stahl in Germany and Bordeu and Barthez in France, and towards the turn of the century, vitalism, in one form or another, was

[47] Cf. above, p. 13 and G. Boas, *French philosophies of the romantic period.* Baltimore, 1925, chaps. 1 and 2.

[48] Cf. below, p. 27.

[49] Cf. Bichat, Recherches physiologiques sur la vie et la mort, in: *Anatomie générale précédée des recherches physiologiques* etc., nouvelle édition, t. 1, Paris, 1818, p. 41. As early as 1795, Alibert had published an article "De l'influence des causes politiques sur les maladies et la constitution physique de l'homme"; cf. L. Brodier, *J.-L. Alibert*, Paris, 1923, p. 383 and *passim.*

[50] Cf. Brodier, *op. cit.*, p. 266 ff.

[51] Cf. *ibid.*, p. 265 ff. and 384. The title was: "Physiologie des passions, ou nouvelle doctrine des sentiments moraux."

[52] Magendie, *Summary* I, p. 153 f. (*Précis* I, p. 227).

accepted by most medical men. Under these circumstances, the ideas of Cabanis are significant since he was the physiologist of the "idéologie."

Cabanis was not a very concise thinker. At first glance it might seem as if life to him were nothing but a complicated interplay of general physical laws. He denied the distinction between inanimate and living matter as "chimerical" and maintained that, under certain conditions, inanimate matter was capable of becoming organized, alive and sensitive.[53] At the bottom of all natural phenomena there was the tendency of bodies to come together. If this tendency expresses itself in different laws and, consequently, different properties, this depends upon "the condition in which the isolated elements find themselves, and the circumstances under which they meet."[54] All this sounds mechanistic enough, almost like an attempt at generalizing the concept of gravitation for all branches of science. But it is contradicted and partly even reversed by a second line of thought.[55] In Cabanis' view we may succeed in discovering the *conditions* under which life emerges from lower forms, but in all probability we shall never be able to penetrate to the *causes* which determine the organization of matter.[56] Cabanis extends this agnostic attitude towards sensibility which for him is "the unique and common principle of the vital faculties."[57] We may study its phenomena but are unable to fathom its cause which cannot be a proper object for research. The operations of the nervous system with which sensibility is closely connected are not to be explained by mere physical or chemical hypotheses; their explanation must be looked for in the living body itself.[58] Thus in spite of his denial of a distinction between inanimate and living matter, Cabanis, to all practical purposes, reintroduced vitalistic ideas. And on top of this he raised the question as to whether the tendency of all matter towards some center of attraction (gravitational, chemical, etc.) was not itself a kind of "universal instinct," still vague in mere gravitation, but attaining its highest form in human intelligence. "Are the other attractions to be explained by sensi-

[53] Cabanis, *Rapports*, p. 471 f.
[54] *Ibid.*, p. 491.
[55] Cf. *ibid.*, p. 492, editor's note.
[56] *Ibid.*, p. 469.
[57] *Ibid.*, p. 111.
[58] *Ibid.*, p. 505. This reference is particularly remarkable in view of the fact that for Magendie too the vital actions of the nervous system above all were excepted from physico-chemical analysis; cf. C. A. Wunderlich, *Geschichte der Medicin*, Stuttgart, 1859, p. 319. Wunderlich is one of the very few historians to connect the names of Cabanis and Magendie directly: "Die Gewebsanatomie Bichat's und Cabanis' Auffassung des Organismus haben die zahlreichen und meisterhaften Untersuchungen Magendie's vorbereitet" (p. 319).

bility, or are sensibility and the intermediate tendencies between these two terms to be explained by gravitation?" [59] Cabanis leaves little doubt that he favors an anthropological interpretation of nature based on introspective experience.[60] Now, the idéologues were heirs to the sensualistic philosophy of Condillac (1715-1780), and the idea of sensibility as the metaphysical center of man and the universe may be called a logical consequence of radical sensualism. But from this concept according to which gravitation is a primordial form of the human will, there is but a short step to Schopenhauer who indeed cited Cabanis in support of his thesis that will was at the core of the phenomena of nature.[61]

Whether Magendie followed Cabanis in his metaphysical speculations remains uncertain, but there is a remarkable analogy between the ways in which the two men considered the interdependence of physical and vital phenomena in physiology. Expounded at great length in the "Rapports," the doctrine is stated more succinctly in Cabanis' "Coup d'oeil sur les révolutions et sur la réforme de la médecine," [62] a book that was written in the year III of the revolution,[63] but not published until 1804. In a footnote of this work, Cabanis refers to his "friend Boyer," [64] the great surgeon who was also the friend of Magendie's father and Magendie's first medical teacher.[65] Cabanis here distinguishes several degrees of existence among natural objects. There are first of all those which do not show any organization and are subject to the general law of physical masses only. Next come the bodies such as crystals and salts which show distinct characteristics due to particular laws of formation. The vegetable kingdom represents the third degree, and the fourth and final degree is reached with the animals, all of which are endowed with feeling. In this chain of beings, "the characteristic laws of each class are found again, in certain respects, in the preceding or following class." [66] Two consequences follow from this position. On the one hand, it is impossible to reduce completely the laws

[59] *Ibid.*, p. 491 f.

[60] *Ibid.*, p. 492.

[61] Cf. Paul Janet, Schopenhauer et la physiologie française. Cabanis et Bichat. *Revue des deux mondes*, troisième periode, 1880, t. 39, pp. 35-59. E. Schiff, *Pierre Jean Georges Cabanis, der Arzt und Philosoph*, Diss. Berlin, 1886, p. 54.

[62] P. J. G. Cabanis, *Coup d'oeil sur les révolutions et sur la réforme de la médecine.* Paris, an XII—1804.

[63] *Ibid.*, p. v: "L'ouvrage suivant a été écrit dans l'hiver de l'an III."

[64] *Ibid.*, p. 324, note: "Quand j'écrivois ceci, l'Anatomie de mon ami Boyer n'existoit pas encore."

[65] Cf. Olmsted, *Magendie*, p. 9.

[66] Cabanis, *Coup d'oeil*, p. 257.

of animal life to mere physics and chemistry as the iatrophysicists and iatrochemists had tried to do. Cabanis attacked them with no less vigor than did Bichat and other vitalists. On the other hand, since the laws of a lower class still operate in the higher ones, physics and chemistry need not be entirely banned from animal physiology. "Some phenomena of the animal economy, from certain points of view at least, belong to simple mechanics. Others are a direct consequence of the structure of the organs and of their mutual relationships. There are phenomena that result from the laws to which the course of fluids in a system of pipes is subjected. There are also such as are purely chemical whereas others, finally, are exclusively due to the action of sensibility." [67]

If in this quotation "vital force" were substituted for "sensibility," Magendie might have identified himself with the views expressed. For Magendie admits that brute and living bodies differ as to form, composition and the laws governing them. Brute bodies are "subjected entirely to attraction and chemical affinity," whereas living bodies are "partly subjected to attraction and chemical affinity, partly subjected to an unknown power." [68] This analysis into a *partly* physical and chemical and a *partly* vital element remained one of the most remarkable features in Magendie's physiology.[69] Even in his "Phénomènes physiques de la vie," published in 1842, he was just as emphatic in proving that physics has a place in physiology as he was serious in his warning not to explain everything "by the laws which hold sway over inorganic matter." [70] It would be misleading to overlook the fact that Magendie went incomparably further than did Cabanis in realizing the importance of physics and chemistry. But it has also to be stressed that his vitalism was more deeply rooted than merely in the prevailing influence of Bichat.

It is possible to pursue the analogy between the vitalism of Magendie and that of the "idéologues" in some more detail. The "vital force," according to Magendie, is an unknown power and this and similar terms merely conceal "the absolute ignorance in which we always have been, and perhaps always shall be, respecting the cause of life." [71] Vital phenomena can be reduced to "nutrition" and "vital action" which are closely interrelated. "Nutrition," fundamentally, is an intimate movement of particles, fresh ones replacing old ones in the organs. "This movement

[67] *Ibid.*, p. 258.
[68] Magendie, *Summary* I, p. 3 (*Précis* I, p. 4).
[69] Cf. Olmsted, *Magendie*, pp. 33, 83 and 202.
[70] Quoted by Olmsted, *ibid.*, p. 203, note.
[71] Magendie, *Summary* I, p. viii f. (*Précis* I, p. iv).

allows no explanation. At the present state of physiology it can by no means be related to the molecular movements which are governed by chemical affinity." [72] By "vital action," Magendie designates such phenomena as the formation of bile by the liver and muscular contraction. And just as in nutrition so in vital action too the mechanism consists in an inexplicable molecular movement. "There occurs in the organ which acts an insensible molecular movement, as inexplicable as the nutritive movement. No vital action, however simple, is an exception in this respect." [73]

Magendie's emphatic insistence that vital force was just a term to hide our ignorance, must not obscure the fact that he took this admission of ignorance very seriously. Observation and experiment might lead to an exact knowledge of vital actions; but here investigation had to rest, further analysis being hopeless. Perhaps this is one of the reasons why Magendie, as an experimenting physiologist, concentrated on vivisection where the vital phenomena could be studied as such.

The problem of vital force had also been taken up by Destutt de Tracy. Feeling and movement (internal as well as external) constitute life; though movement may be considered the prior faculty since even purely intellectual perceptions presume some movement taking place in our organs.[74] The "vital force" (force vitale) is the cause of the movements though we do not know how the latter are brought about. But since we have to acknowledge the reality of life as contrasted with death, we also have to acknowledge a vital force.

Thus life is something: also life it is which effects that as long as a body is endowed with it, that body has the power of assimilating to its substance the bodies with which it is in suitable contact, whereas, as soon as it is dead, all the elements which compose it, disintegrate, separate and enter into new combinations with the surrounding beings, following new laws of affinity. We do not know of what this vital force consists; we can only picture it to ourselves as the result of attractions and chemical combinations which for a time give birth to a particular order of facts and soon, by virtue of unknown circumstances, return to the realm of more general laws, which are those of unorganized matter.[75] As long as it endures, *we are alive*: that is, *we move and feel.*[76]

[72] Magendie, *Précis* I, p. 20.

[73] Magendie, *Summary* I, p. 16 (*Précis* I, p. 22). The ideas on nutrition and vital action were already propounded in his essay of 1809; cf. Olmsted, p. 28.

[74] Destutt de Tracy, *Élémens d'idéologie*, I, p. 246 f. However, in vol. 4, p. 494, he admits that sensibility may be "une propriété universellement répandue dans toute la nature." His attitude in this respect is fundamentally the same as that of Cabanis.

[75] A similar idea occurs in Bichat's *Anatomie générale* (cf. above, note 49), p. 18. On Bichat's relationship to the idéologues, cf. below, p. 26 f.

[76] Destutt de Tracy, *op. cit.*, I, p. 248 f. A striking parallel to the last sentence occurs in

To sum up: Both Magendie and Destutt de Tracy believe in the autonomy of animal life, an autonomy expressed by the concept of vital force. But the vital force is not on a par with physical and chemical forces.[77] It represents the integration of molecular movements on a new and higher level. Since we are unable to fathom the principle of this integration, we cannot consider the human organism a mere machine as Descartes had done before. With Destutt de Tracy and Cabanis, Magendie was rooted in the sensualistic tradition which went back to Condillac and Locke and which did not identify itself with the mechanical rationalism of Descartes.[78]

4.

It is hardly necessary to point out that Magendie was not a " disciple " of Cabanis and Destutt de Tracy, if by this word is meant the faithful adherent of a detailed body of doctrines. The " idéologie," after all, was nothing but a philosophical background for him, a background which he shared with many of his contemporaries. In fact, the circle of men with varying shades of opinion who have been named " idéologues " [79] is so wide that the term is not free from vagueness. This circumstance makes it desirable to comment briefly on at least two physiologists, viz. Richerand and Bichat, because Magendie had to compete with the textbook of the former and the ideas of the latter.

A superficial glimpse at Richerand's " Nouveaux éléments de physiologie " suffices to show how wide-spread was the influence of Cabanis

the opening of Legallois' Expériences sur le principe de la vie (*Oeuvres*, t. 1, Paris, 1830, p. 33): " Parmi les facultés propres aux animaux, celles qui les caractérisent éminemment sont la faculté de sentir et celle de se mouvoir, et l'on peut dire que le véritable but de l'organisation d'un animal est de produire et d'entretenir ces deux facultés. Quels que soient les moyens intérieurs ou extérieurs, les ressorts secrets ou apparens que la nature emploie pour cela, et quel que soit l'état actuel de ces moyens et de ces ressorts, dès qu'un être sent et se meut spontanément, c'est un animal vivant et qui a le sentiment de son existence."

[77] Destutt de Tracy (*op. cit.*, p. 247) is careful to point out that our power of spontaneous movement does not constitute a new physical force.

[78] Destutt de Tracy, *Éléments d'idéologie*, IV, p. 491 ff., argues against Descartes' concept. On the fate of mechanistic ideas in 18th century France cf. L. C. Rosenfield, *From beast-machine to man-machine*, New York, 1941, particularly ch. 2 and pp. 195 ff. On the connection between sensualism and French physiology and psychology cf. Sudhoff-Pagel, *Kurzes Handbuch der Geschichte der Medizin*, 3. u. 4. Aufl., Berlin, 1922, pp. 333 f., 351 and 359 ff., where Cabanis' influence is also mentioned.

[79] Cf. particularly the standard work by Picavet (see above, note 11) and E. Cailliet, *La tradition littéraire des idéologues*, Philadelphia, 1943 [Memoirs of The American Philosophical Society, vol. 19, 1943].

and Destutt de Tracy during Magendie's formative years. Balthasar-Anthelme Richerand (1779-1840), famous as a surgeon and the rival of Dupuytren, had been a favorite disciple and friend of Cabanis. His textbook of physiology, which was first published in 1801, immediately became very popular inside as well as outside France, going through one edition after another till by 1832 it had expanded into three volumes.[80] It is said that the appearance of this text decided Cabanis to refrain from publishing the manuscript of a treatise on physiology which he himself had prepared.[81] The inclusion of Richerand among the idéologues, therefore, seems justified.

Richerand's "Elements" are modeled after Haller's "First Lines of Physiology"—such at least is the contention of the author.[82] The name of Condillac appears already in the preface, to be mentioned again and again in the work, particularly in those sections which deal with sensations.[83] But Richerand also takes issue with Condillac. Thus he blames him for having left "much doubt and uncertainty" regarding the individual faculties of the soul until Destutt de Tracy brought final clarity into the matter.

> The merit of dispersing the mist which covered this part of metaphysics, remained for M. Tracy. His Elements of Ideology, leave nothing to be wished for on this subject. I shall extract some of its main results, referring the reader for the rest to the work.[84]

Another point where Richerand deviated from Condillac concerns the external senses as the sole portal for sensations. Condillac had claimed that our ideas were derived from the impressions we receive through our external sense organs. Cabanis had considered this explanation insufficient and had added those impressions which resulted from the functions of

[80] Cf. A. Bonnet, article "Richerand" in: *Nouvelle biographie générale*, t. 42, Paris, 1863, cols. 253-255; Olmsted, *Magendie*, p. 66. In the following I make use of the American edition: *Elements of Physiology*, by A. Richerand. Translated from the French by G. J. M. De Lys, with notes by N. Chapman. Philadelphia, 1813.

[81] Cf. Peisse in: Cabanis, *Rapports*, p. xxxiii, note 3.

[82] Cf. Richerand, *op. cit.*, p. v.

[83] *Ibid.*, ch. VII: "Of Sensations."

[84] *Ibid.*, p. 400. This reference to Destutt de Tracy is similar to that made by Magendie in the latter's "Summary." Cf. above, p. 14. Another striking similarity occurs on p. 408 f. of Richerand's *Elements*: ". . . in a word, the knowledge of moral and intellectual man, belongs to the science known by the name of metaphysics or psychology, of analysis of the understanding, but better described by that applied to it by the writers of our days, ideology. On this science, you may consult, with advantage, the philosophical works of Plato and Aristotle among the ancients; of Bacon, Hobbes, Locke, Condillac, Bonnet, Smith, Cabanis, and Tracy among the moderns."

internal organs.[85] These internal impressions, in the opinion of Cabanis, accounted for instinctive actions, and he noted "that the order which nature had established in this regard is extremely favorable for the preservation and the well-being of animals."[86] Destutt de Tracy laid much stress on these internal sensations which he believed present in all "sentiments" and "passions."[87] Richerand likewise accepted this step beyond Condillac. "But we are compelled to acknowledge with Cabanis, two sources of ideas quite distinct from each other: the external senses, and the internal organs. . . . Instinct, as the author just quoted has very justly observed, springs from impressions received by the interior organs, whilst reasoning is the produce of external sensations . . ."[88]

The differentiation between the realms of external and internal sensations finds, of course, a striking parallel in Bichat's distinction between the two lives of man, the animal and the organic. Indeed, Broussais (1772-1838) suggested that Bichat had adopted this idea from Cabanis.[89] The question of Bichat's relationship to the idéologues is a very complicated one,[90] confused by personal recriminations. Thus Cabanis made it rather clear that in his opinion Bichat had appropriated some of his views without giving proper credit; but he did not say to which views he was referring.[91] Richerand quite generally accused him of plagiarism. Praising Bichat's "Anatomie générale," Richerand added: "That glory would be complete, if in that book, and yet more, in his other works, he had done his predecessors, as well as his contemporaries, the justice they had a right to expect from him."[92] Bichat's relative and collaborator, Buisson, on the other hand, said that others had appropriated for themselves the distinction which Bichat, in his "Recherches physiologiques sur la vie et la mort," had established between the central and ganglionic nervous systems.[93] Richerand seems to have defended himself against such suspicions

[85] Cabanis, *Rapports*, p. 118.

[86] *Ibid.*, p. 120.

[87] Destutt de Tracy, *Élémens d'idéologie*, I, pp. 37-39 and 422.

[88] Richerand, *op. cit.*, p. 392.

[89] F.-J.-V. Broussais, *Examen des doctrines médicales et des systèmes de nosologie*, t. 2. Paris, 1821, p. 389. Richerand, *op. cit.*, p. 72, claimed that the idea belonged to Grimaud. On this whole question cf. Arène, *op. cit.* (note 90), p. 779, and M. Genty, Bichat et son temps, chaps. 4 and 5, *La médecine internationale*, July 1934—Sept. 1935.

[90] Cf. on this subject A. Arène, Essai sur la philosophie de Xavier Bichat, *Arch. d'anthropol. crim.*, Oct.-Nov., 1911, pp. 753-825.

[91] Cabanis, *Rapports*, p. 48.

[92] Richerand, *op. cit.*, p. 19.

[93] M. F. R. Buisson, Précis historique sur Marie-François-Xavier Bichat, in Bichat's *Traité d'anatomie descriptive*, t. troisième, terminé et publié par M. F. R. Buisson. Paris, an XI (1802), p. xix, footnote. Cf. also Picavet, *op. cit.*, p. 435 f.

when he stated that his own researches on the sympathetic nerves went back as far as the year VII, " before anything that has appeared on the same subject." [94]

These accusations and counter-accusations reveal two things. In the first place, they serve to make clear that, through mutual influence or otherwise, Bichat and the idéologues show far-reaching agreement. This is particularly true with regard to Richerand and from this point of view, Magendie's revolt against Bichat is also a revolt against Richerand, and his reproach of systematizing may have been directed against the former as well as the latter.[95] But the strained relationship also suggests that Bichat was not in harmony with all the ideas of the idéologues. These differences apparently related to metaphysical questions. Condillac, sensualist that he was, still believed that it was the soul that felt, the organs of the body being its agents.[96] Cabanis and Destutt de Tracy, however, had little use for the soul; to them feeling became a biological phenomenon or even a general attribute of matter.[97] Now there is no doubt that Bichat was strongly influenced by Condillac [98] and it is not certain that he was willing to abandon the soul altogether. It is Condillac rather than Cabanis who made him say: ". . . for the brain is to the soul what the senses are to the brain; it transmits to the soul the impressions conveyed to it by the senses, as the senses convey to the brain the impressions made upon them by external objects." [99] Likewise, he remarked that the pleasure, pain and indifference which accompany our sensations are " by no means seated in the organs, which receive or transmit the sensation, but in the soul." [100] And a little later he warned against insisting upon the principles of physiology where they endangered those of morality. " The one, and the other are equally solid, though sometimes at variance." [101]

[94] Richerand, *op. cit.*, p. 57, footnote. I do not know whether this note already occurred in the first edition. On Richerand's hostile attitude towards Bichat cf. Genty, *l. c.* (note 89), and G. Genty, *Bichat, médecin du Grand Hospice d'Humanité*, Clermont (Oise), 1943, p. 24 f.

[95] Cf. Olmsted, *Magendie*, p. 66.

[96] Cf. M. Frischeisen-Köhler and W. Moog, *Die Philosophie der Neuzeit bis zum Ende des XVIII. Jahrhunderts.* 12. Auflage, Berlin, 1924, p. 433 f. [Ueberwegs Grundriss der Geschichte der Philosophie III]. Cf. Condillac, Traité des sensations, in: *Oeuvres complètes de Condillac*, t. 3, Paris an VI. 1798, p. 51, note.

[97] Cf. above, pp. 20 and 23.

[98] Cf. Arène, *op. cit.*, p. 754 ff and 803.

[99] Xavier Bichat, *Physiological researches on life and death* (translated by F. Gold), with notes by F. Magendie (translated by G. Hayward). Boston, 1827, p. 30 f.

[100] *Ibid.*, p. 49.

[101] *Ibid.*, p. 50.

Statements like the above suggest that from the point of view of systematic philosophy, a line has to be drawn between Bichat and the idéologues.[102] But in the framework of the present article which is centered upon Magendie these metaphysical differences do not yield any clear lead. Magendie and even Richerand also mention the soul, yet this fact is hardly sufficient to class them with Bichat against Cabanis. Moreover, the outcry against materialism in the early 19th century, rightly or wrongly, included Bichat,[103] for the differences paled before the similarities. Nevertheless, regarding some basic problems more closely related to physiology, Magendie seems to have stood closer to Cabanis than to Bichat. He did not agree with Bichat's distinction between animal and organic life, yet he accepted Cabanis' distinction between external and internal sensations in the following words:

> All sensations coming from within, arising independently of external agents, have been collectively designated by the denomination of *internal sensations*, or *sentiments*. Their consideration was neglected by the metaphysicians of the last age; but this has now become the object of the study of many distinguished authors, particularly of Cabanis, and M. Destutt-Tracy, and their history is one of the most curious parts of ideology.[104]

Moreover, in asserting that physics and chemistry had their legitimate place in physiological research, Magendie took an attitude which could more easily be reconciled with Cabanis' than Bichat's contentions. According to Bichat the vital properties of the tissues rather than their physical qualities decided all the phenomena of life. Since the former were opposed to physical and chemical laws, any attempts at mathematical exactness were eo ipso futile. Cabanis' argument was not so much a biological as a historical one. The dogmatic systems of iatrochemists and iatrophysicists had failed, attempts at measuring the muscular force necessary for digestion or of the heart had brought nothing but misleading and contradictory results:[105] therefore it was wrong to expect a solution of *all* medical problems from the exact sciences, for no more than a small province could be allowed to them.[106] Magendie quite agreed that physics and chemistry

[102] Cf. Arène, *op. cit.* p. 822, note 1, who rightly points to Bichat's disdain of "philosophy."

[103] Cf. Arène, *op. cit.*, pp. 784 and 824 f.

[104] Magendie, *Summary* I, p. 94 (*Précis* I, p. 138).

[105] Cabanis, *Coup d'oeil*, p. 246 f.

[106] *Ibid.*, p. 246, note: "Sans doute les phénomènes de la vie peuvent, sous quelques points de vue, se prêter au calcul: mais ces points de vue sont en général peu importans" etc. In a final note to his *Du degré de certitude de la médecine* (nouvelle éd., Paris, an XI—1803, p. 161 f.) Cabanis even says: "Il faut convenir, de plus, que certaines parties

must not dominate physiology *exclusively*.[107] But the historical data of Cabanis could be countered by arguments taken from more recent history:

> . . . even in the time of Bichat it could not be denied that it was to the progress of these same sciences, that was owing the explanation of many very important phenomena; that by it was ascertained what takes place in respiration, and by what means a living body always supports itself between certain limits of temperature, etc.[108]

This quotation, of course, refers to the famous experiments by Lavoisier and Laplace on respiration and animal heat. Flourens [109] as well as Claude Bernard [110] have stressed the influence of Laplace on Magendie's early development and the testimony of these two men has to be accepted. It is likewise certain that Laplace and the chemist Berthollet (1748-1822) took an active interest in Magendie's work,[111] just as (together with Corvisart) they had sponsored that other physiological experimentalist, Legallois.[112] The two famous men, both connected with the Ecole polytechnique,[113] encouraged the progress of experimental physiology, and Magendie, in turn, was inspired by the example set by the exact scientists and particularly by Laplace.

The rôle which Magendie played in making physiology an experimental science will have to be discussed further in the following section. But just because Laplace has been brought into such close relationship to this rôle,[114] it has to be pointed out that Laplace himself has been numbered among the

de la physique animale, telles que l'appréciation des forces musculaires, la théorie de la vision, peut-être même celle de l'audition, ne paroissent guère pouvoir être traitées complètement, sans le secours des mathématiques." Magendie himself did by no means subscribe to an unwarranted extension of mathematical methods (cf. below, note 131), on the contrary, he has been blamed for neglecting measurement; cf. Wunderlich, *op. cit.*, p. 319 f. This somewhat narrows the gap between him and Cabanis (and even Bichat) whose main attack was directed against pretended mathematical exactness.

[107] Cf. above, p. 22.

[108] Bichat, *Physiological researches* etc., p. 80, note.

[109] Flourens, *op. cit.*, p. 20 f.

[110] Claude Bernard, *Rapport sur les progrès et la marche de la physiologie générale en France*, Paris, 1867, p. 6, and *Leçons sur les effets des substances toxiques et médicamenteuses*, Paris, 1857, p. 7.

[111] Cf. P. Menetrier, Documents inédits concernant Magendie, *Bulletin de la Société Française d'Histoire de la Médecine*, 1926, t. 20, p. 254, and Olmsted, *Magendie*, p. 152.

[112] Notice biographique sur M. Legallois, *Bulletin de la Faculté de Médecine de Paris*, 1814, no. 5, p. 105 f.

[113] Cf. F. A. v. Hayek, The counter-revolution of science, *Economica*, new series, 1941, vol. 8 [pp. 9-36, 119-150 and 281-320], p. 17. I mention this relationship because I believe that v. Hayek has somewhat over-emphasized the contrasts between engineers and physicians.

[114] Cf. Olmsted, *Magendie*, p. 19 f. and *passim*.

idéologues.[115] Cabanis had praised Laplace's lectures on probability,[116] and in his "Essai philosophique sur les probabilités," Laplace spoke of psychology as a mere extension of physiology. The sensorium in the brain, being continuously modified by impressions from the nerves, was the seat of sensation and thought.[117]

The argument of the present section offers a possible answer to the question why so little attention has been given to Magendie's affiliation with the ideas of the idéologues. These ideas were so current among contemporary physiologists that they seemed hardly worth while mentioning. What singled Magendie out was not his conformity with, but his departure from tradition. This departure will have to be discussed in the following final section.

5.

It is not very surprising to find Magendie leaning towards the philosophy of the idéologues. The group had its social center in the salon of Madame Helvétius at Auteuil where Cabanis had met Condillac, Holbach, Jefferson, Franklin, Turgot and Destutt de Tracy, and where, among others, the physicians Richerand, Alibert, Pinel, Pariset and Moreau de la Sarthe were wont to assemble.[118]

Many of these men had become actively associated with the revolutionary movement. When the "Institut" was founded in 1795, its class of "sciences morales et politiques" had a "section de l'analyse des sensations et des idées,"[119] and this section was the academic center of the school. But in 1802 Châteaubriand published "Le génie du christianisme" in which he attacked the "sophists"; in 1803 Napoleon reorganized the Institut and suppressed the section and in the following years the fight against "materialism" and for cultural and political restoration became more pronounced and successful.[120] But even after the return of Louis XVIII in 1815, the idéologues were by no means silenced.[121] In 1818, Pinel and Bricheteau wrote an article on "Idéologie" in which they

[115] Cf. Picavet, *op. cit.*, p. 169 ff. and Cailliet, *op. cit. passim.*

[116] Cabanis, *Rapports*, p. 43, footnote.

[117] Laplace, *Essai philosophique sur les probabilités*, cinquième éd., Paris, 1825, p. 219 ff.

[118] Cf. Peisse in: Cabanis, *Rapport*, pp. xiii and xxiii and P. Delaunay, La médecine et les idéologues: L. J. Moreau de la Sarthe, *Bull. Soc. Franç. d'Hist. de la Méd.*, 1920, 14, pp. 24-60; cf. pp. 37 ff.

[119] Peisse, *l. c.*, p. 61.

[120] Cf. Boas, *op. cit.*, p. 26.

[121] Ferraz, *Etude sur la philosophie en France au XIXe siècle. Le socialisme, le naturalisme et le positivisme.* Paris, 1877, p. 239.

stated: "It is doubtless not necessary for the physician to make a profound study of ideology, although he must on no account be ignorant of its fundamental principles . . ." [122] In 1832, following the revolution of 1830, the section de l'analyse etc. was resuscitated under Guizot as the section of philosophy, and Broussais was chosen to represent the medical point of view.[123] Gradually, however, the names of Cabanis and Destutt de Tracy became a historical memory. Claude Bernard does not seem to have been influenced by the works of these men in a directly formative way, though sensualism of course remained very much alive among physicians and biologists. Magendie thus appears as a connecting link between the idéologues proper and the physiologists succeeding him. The son of an ardent revolutionary and himself "an extreme liberal," [124] Magendie was naturally attracted towards a philosophy which in his youth was a living issue.

The revolutionary background of the idéologues is very noticeable in their claim to metaphysical agnosticism, their rejection of systems and their emphasis on positive facts. "Analysis" was the catchword of the movement, an analysis that was to reveal simple constituent phenomena and their relations, but not first or final causes. Analysis was, therefore, opposed to the systems erected upon theological or metaphysical presuppositions, or derived from one-sided generalizations. Systems of this kind were denounced as loudly during the 1790's as was the political tyranny of the kings. In philosophy, physiology and medicine, the old systems had to be done away with if an edifice of reliable knowledge, founded on well established facts, was to be erected.

"Rational analytic philosophy," Cabanis said, "must begin to march according to the facts after the example of all those parts of human science that have acquired veritable certitude." [125] And with an eye upon medicine, he wrote: "The real treasures of the sciences lie in the constant and recognized truths and not in the display of systems. They are measured by exactness and not by number or the apparent grandeur of the ideas. Even when the methods of investigation are perfectly sure, one cannot repeat the application to the same objects too many times." [126] Similar views could be quoted from Alibert's "Quelques réflexions sur la valeur

[122] *Dictionaire des sciences médicales par une société de médecins et de chirurgiens*, vol. 23, Paris, 1818, p. 473.

[123] Cf. Peisse, *l. c.*, p. 62.

[124] Cf. Olmsted, *Magendie*, p. 91 f.

[125] Cabanis, *Rapports*, p. 129.

[126] Cabanis, *Coup d'oeil* (see above, footnote 62), p. 269 f.

des systèmes dans l'étude des sciences" which appeared in 1797,[127] and Bichat, speaking of first causes, said:

> Of what importance besides to us are these causes? Is it necessary to know the nature of light, of oxygen and caloric to study their phenomena? Without the knowledge of the principle of life, cannot we analyze its properties? In the study of animals let us proceed as modern metaphysicians have done in that of the understanding. Let us suppose causes, and attach ourselves to their general results.[128]

The latter reference to the "modern metaphysicians" must be interpreted as including the idéologues.[129] Indeed, whatever differences may have existed between the latter and Bichat, there was agreement upon the necessity of a positivistic approach to physiology. Here was the connecting link with the tradition of Albrecht von Haller [130] as well as with the exact sciences.[131]

The beginning of Magendie's preface to his "Précis" sounds almost like a summary of these views. He states that "every natural science may exist under two different forms, 1. systematic; 2. theoretical." The systematic form is based on "gratuitous suppositions," on "principles established *a priori*," and facts are sought for only to uphold a hypothesis. The theoretical form, on the other hand, rests on facts; "the learned endeavour to verify them, and to multiply them as much as possible, and afterwards study the relations of the different phenomena, and the laws to which they are subject." The method of the systematic form is "synthetic," that of the theoretical form is "analytic." [132]

These words might as well have been written 20 years before. But then the preface takes a turn which puts it in a provocative contrast to Magendie's predecessors. Before the time of Galileo and Bacon, he continues, almost all natural sciences were systematic, whereas since then they have become theoretic and analytic and more perfect from day to day. Yet physiology has not shared in this process, it has remained systematic.

[127] Cf. Brodier, *op. cit.*, pp. 242 ff. and 383.

[128] Bichat, *Physiological researches* etc., p. 77.

[129] Bichat was, of course acquainted with that part of Cabanis' *Rapports* which had been published in the *Mémoires* of the Institut since he refers to it in his *Recherches physiologiques*, *l. c.*, p. 89.

[130] Cf. Albrecht von Haller, *A dissertation on the sensible and irritable parts of animals*, Baltimore, 1936, pp. 7-8.

[131] On the formulation of French positivism by D'Alembert and other scientists before Comte cf. H. Gouhier, *La jeunesse d'Auguste Comte et la formation du positivisme* II, Paris, 1936 [Travaux et mémoires de l'Université de Lille, Nouv. sér.—Droit—lettres, 18], pp. 5-62, and v. Hayek, *op. cit.*, p. 11 ff. Magendie cites D'Alembert with approval in his *Summary* II, 2, p. 7, note (*Précis* II, p. 251), for his contention that experiments are the only promising path where a mathematical treatment of phenomena is impossible.

[132] Magendie, *Summary* I, vii f. (*Précis* I, p. i ff.)

If we attentively examine the manner in which it is treated in the best works, we shall find it founded upon mere suppositions, to which every one attaches at pleasure, the numerous phenomena of life, thinking that he is explaining them satisfactorily. What in fact are the *vital* or *animal* spirits of the ancients, the *faculties* of Galen, the *moving* and *generating principle* of Aristotle, *the archeus, the vital principle, power* and *properties*, &c. which have been successively adopted to explain the animal functions, but arbitrary suppositions, which served through many ages to conceal the absolute ignorance in which we always have been, and perhaps always shall be, respecting the cause of life?[133]

This passage has a certain similarity with one written by Bichat who had condemned as futile " the archeus of van Helmont, the soul of Stahl, the vital principle of Barthez, the vital power of others." [134] By including the vital properties in his list, Magendie obviously aimed at Bichat himself, and there is indeed little doubt that Bichat, Richerand [135] and many of his contemporaries appeared as systematizers to Magendie. But his statement that physiology, 14 years after Bichat's death, was still in its systematic form and consequently " still in its infancy " shows more than an attack upon Bichat's theories. It reveals the point where Magendie had developed beyond the tradition of the idéologues.

When Cabanis insisted upon a reform of medicine which would discard hypotheses and, instead, reorganize the mass of factual observations and experiments he was moved by a spirit of optimism. " Twenty-five or thirty years would suffice today to verify all observations (except perhaps those which refer to the epidemic constitutions). The same amount of time would also suffice for repeating all experiments and ascertaining their results." [136] If it is remembered that this was written in the year III of the revolution, " twenty-five or thirty years " would come near the publication of Magendie's " Précis." But then Cabanis conceived of this medical reform somewhat in the manner of those revolutionaries who thought that with the king and feudalism abolished, all the good qualities of man would soon assert themselves. After all, the idéologues believed in the perfectibility of man, and the temper of the time made men expect perfection soon. Just as the revolution ended in the splendor of Napoleon's empire, so the battle against hypotheses and one-sided theories often ended in new systems incorporating old and new facts. For this, the experimentalist and speculative physiologist Bichat was an outstanding example. And even the name of Laplace who wished " that every science be nothing but a unity of rigorously connected facts " [137] is bound up with an astronomical hypo-

[133] *Ibid.*, p. viii f.
[134] Bichat, *Physiological researches*, p. 76 f.
[135] Cf. Olmsted, *Magendie*, p. 66.
[136] Cabanis, *Coup d'oeil* etc., p. 275.
[137] Flourens, *op. cit.*, p. 21.

thesis. The desire to give a synthesis was strong among most idéologues though not always admitted. " In fact, I have not made a system," Destutt de Tracy answered a criticism that his system was inexact. He claimed only a collection of facts. If the latter fitted so well together as to deserve the name of a system, it would simply be that of nature herself and could not be called inexact. If, on the other hand, it contained badly observed facts (as very probably it did) they disrupted the connection of the others and there was no longer any general system. Instead of speaking of an inexact system, the critic ought to have unmasked the wrong facts.[138]

Magendie could hardly have taken exception to the logic of this argument. His criticism of contemporary physiology was not based on a philosophy opposed to that of the idéologues, but on applying the same philosophical arguments under different circumstances. Endowed with an uncompromising temperament, he perceived that the physiologists of the revolution had not kept faith with their own premises. Recognizing the value of physical and chemical contributions, he turned against the dogmatic rejection of these sciences from physiological research. Declaring physiology to be backward compared with other sciences, he refuted the claim of Bichat and Richerand to have employed physiological principles as solid as Newton's concept of gravity.[139] By contending that physiology, in 1816, was still in its infancy, he denied that it was ready for a systematic synthesis. In the preface to the " Précis " he proclaimed his aim of helping to put physiology upon equal terms with the most advanced sciences.

> It must take the analytic course and the theoretic form. . . . There will therefore above all be found in this work facts which I have directly verified as much as was in my power, either by observation upon the healthy or diseased subject, or by experiments upon living animals. Among these facts will be found many which are new.[140]

The idéologues had insisted upon facts and Magendie was, therefore, praised by men like Pinel.[141] But the idéologues and those close to them had hardly been prepared to acknowledge that in physiology the sum total of available facts was lamentably small. They welcomed new discoveries, but their writings show their belief that the facts were already largely assembled and would stand out clearly as soon as they were sifted and properly arranged. Such at least was Cabanis' avowed conviction [142] and

[138] Destutt de Tracy, *Élémens d'idéologie*, III, p. 280 f., note.
[139] Cf. Olmsted, *Magendie*, p. 64.
[140] Magendie, *Summary*, I, p. ix (*Précis* I, p. iv f.).
[141] Cf. Olmsted, *Magendie*, p. 43 f.
[142] Cf. above p. 33.

Bichat, great anatomist and experimentalist that he was, deplored above all that the physiologist had not yet learned to go back from the phenomena to the underlying vital properties in the manner in which the chemist and physicist referred everything to affinity, gravity, elasticity etc.[143] Even Magendie at first seems to have been satisfied with a criticism of methods and concepts.[144] Yet his whole life work, as so clearly depicted by Dr. Olmsted, evinces not only his insistence on facts but, above all, his striving for new facts, so that his work more and more took on the character of a mere conglomeration of experimental results. The older Magendie became and the further the influences of his youth receded, the stronger this tendency seems to have grown. This is Magendie, as Claude Bernard knew him.[145]

Facts can be valued for various reasons. In the first place, they represent truth, and herein Magendie and the idéologues agreed. If assembled in large numbers, facts may lead to an integrating theory affording a wide perspective. With the qualifications that Destutt de Tracy and Laplace had given to the term, the idéologues believed that such a "system" could be built in their time, a belief which Magendie did not share. Yet he too believed in the perfectibility of medicine; the time would come when, with the help of physics and chemistry, the body of exact knowledge would have assumed such proportions as to make medicine equal to its task.[146]

In the meantime, the fight for truth and limited knowledge as opposed to vague opinion had to go on relentlessly, though it implied therapeutic nihilism. This was "the scepticism which germinated into scientific medicine."[147] Entering upon this path, Magendie stepped out of his ideological background and became a protagonist of the medical positivism of the 19th century.

[143] Cf. the "Considérations générales" at the beginning of Bichat's *Anatomie générale*.

[144] Cf. Olmsted, *Magendie*, p. 27 f.

[145] Cf. *ibid.*, p. 238 f.

[146] Magendie, *Phénomènes physiques de la vie*, 4 vols., Paris 1842; vol. 1, p. 17: "Quant à nous, nous voulons vous diriger dans le sens du perfectionnement de la médecine; or, la médecine ne peut se perfectionner sans des connaissances positives sur les grands phénomènes de la nature." *Ibid.*, vol. 4, p. 2 f.: ". . . les effets des maladies sont étudiés depuis long-temps, ils sont en grande partie connus; remontons à leurs causes; tâchons de les découvrir, étudions-les patiemment une à une, et alors nous pourrons peut-être modifier leurs effets nuisibles avec avantage. C'est là, n'en doutez pas, qu'il faut nous rallier; c'est vers ce but qu'il faut diriger tous nos efforts. L'entreprise n'est pas aisée, car rien n'est tenace et persistant comme une idée absurde passée dans le domaine public, et il y en a beaucoup de ce genre aujourd'hui dans la théorie et la pratique de la médecine; mais vous le savez, Messieurs, plus l'oeuvre est difficile, plus il est glorieux de l'entreprendre, et lors même que nous n'aurions réussi qu'à mettre nos successeurs sur la voie de l'achever un jour, nous croirions avoir assez dignement rempli notre tâche."

[147] Olmsted, *Magendie*, p. 155.

THE HEBREW-ARAMAIC ELEMENT IN VESALIUS

A Critical Analysis

MORDECAI ETZIONY

To my
Yafah Etziony,
friend at all times.

Introduction.

The present paper is a continuation of the study the writer made of Vesalius' Six Anatomical Tables.[2] It aims to analyze the Hebrew element found in the *Fabrica* and compare it with that found in the Tables, whenever this is called for. Most of the remarks made in the introduction to the paper on the *Tabulae* may well be applied here and it is hardly necessary to repeat them, but a few supplementary remarks, are in order. It was pointed out that Vesalius most probably knew no Hebrew, a statement which not merely finds support in Hyrtl [5] but is well borne out by the many errors of various kinds other than those allowed and ascribed to the printer. It looks as though Vesalius got the Hebrew equivalents from somebody and himself took down their transliteration which is very often wrong. If, however, we are to suppose that both the Hebrew equivalents and their transliterations were written for Vesalius by his Hebrew friend Lazarus de Frigeis of Venice as Hyrtl suggests,[5] and as is also clearly indicated in the first paragraph on page 166 of the *Fabrica*,[6] then we must also credit the latter with little knowledge of Hebrew since some of the grammatical mistakes are inexcusable for a connoisseur of the language, as will be seen in the analysis. Another thing which justifies the assumption that Vesalius was ignorant of Hebrew or that even his friend was a poor scholar, is the fact that the transliteration of the Hebrew terms both in the *Fabrica* and in the *Tabulae* is most chaotic and variable. Surely one could not accuse the truly thorough and scientific Vesalius of carelessness in being responsible for this variable spelling throughout the work under consideration.*

It is strange that for some reason or other the Hebrew equivalents

* The scientific spirit of Vesalius is questioned very much by Chas. Singer and Ch. Rubin of Oxford in their thorough study of Vesalius' *Tabulae* which is about to be published and the early galleys of which the authors were kind enough to send to this writer following the publication of his paper on the *Tabulae*.

are found only in the three pages at the end of Liber I of the *Fabrica*, viz., pp. 166-168, and in a short marginal note on p. 233 (first pagination), 1543 edition,[9] or pp. 206-208 and p. 279, respectively, 1555 edition.[10] Why this small portion of the whole *Fabrica* should be favoured with the Hebrew language while the rest omits it entirely, is a puzzle. Moreover, even in these three pages we find that not all terms have their Hebrew equivalents beside them. Again, while some terms lack the Hebrew equivalent entirely, others are compensated with two synonymous equivalents for one single term. This suggests that the Hebrew terminology at that time was yet far from being full and standardized, but it may also indicate that Vesalius did not avail himself of all the terms known then, either through ignorance or deliberation, but the first alternative is probably more correct. Another support for the contention that the Hebrew medical terminology was even in the Vesalian period not yet standardized, or, what is just as probable, that Lazarus de Frigeis was not an "anatomical linguist," is the fact that some of the terms are rather descriptive and explanatory than definite standardized terms, e. g., the Hebrew equivalents of the malleoli or the xiphoid process.

Regarding the script, it will suffice to mention that in the *Fabrica* we find the printed square-letter type of Hebrew, whereas in the *Tabulae*, excepting two terms, the cursive type known as "Kthav Rashi" is used throughout. However, the letters in both places are of a poor type so that some of them though very distinct in pronunciation but similar in form, may be quite easily mistaken for another, for example: ת th and ף f, or ה h and ח ch. This poor type of Hebrew letters that is apparently used also in the Hebrew rendition of Avicenna misled even the scholarly Hyrtl[5] (p. 15); thus for instance, he read and transliterated the word העורף (haoreph) as העורת (haoreth).

It must be pointed out that Friedenwald[3] is wrong in stating, "It is noteworthy that Vesalius does not give Arabic equivalents." Vesalius does give a good many of them in both the *Tabulae* and the *Fabrica*. They are not however in Arabic script but in Hebrew and Latin transliteration. This fact lends support to the statement made in the introduction to the analysis of the *Tabulae* that Arabic was in Vesalius' period a closed book to the Western world and that only the Jews knew it who "thus held the key to medical science."[2] As concerns the two editions of the *Fabrica*, those of 1543 and 1555, it is surprising that the later edition has four mistakes in corresponding terms rendered correctly in the earlier edition, for three of which we may blame the printer, whereas one may indicate an attempt to "correct" the term. On the whole, however, the

mistakes in the second edition show clearly that there was no expert supervision in the re-printing.

A comparative study of the Hebrew terms found in Vesalius and those used in the present medical Hebrew would doubtless be an interesting undertaking, but that does not enter the scope of our present study. However, in some cases the modern equivalent is given in addition to that of Vesalius.

References are given only in the case of some Hebrew terms. The occurrence of those equivalents which are of common use in old or modern Hebrew has not been traced to any particular place in literature. Practically all references quoted are those found in Jastrow.[6]

All those terms which are also found in the *Tabulae*, and for one reason or another deserve special consideration, are referred to their place there for comparison. In that case the Table and the number of the term in question as found in the analysis of the *Tabulae* [2] are given, e. g., Tabula IV, 14.

The writer wishes to express his sincere thanks to Dr. W. W. Francis, Librarian of the Osler Library, McGill, for his kindness and valuable suggestions. To Mr. Y. Weingarten, noted Hebrew scholar and pedagogue, a word of appreciation is due for reading the manuscript before its final shape.

THE FABRICA OF VESALIUS

Edition of 1543, pp. 166-168 and p. 233 (first pagination)

P. 166, Lines 13-14:

". . . os. Hebraeis autem עצם hezem . . ."

Its proper transliteration is etzem, meaning bone, a feminine noun; in Vesalius, however, it is used throughout as a masculine noun, consequently all adjectives used with this word in the subsequent pages are also wrongly of masculine gender. In Tabula V, 2 the term is properly transliterated.

Line 14:

" Cartilago . . . השחוסים hascechusim. . . ."

Its proper transliteration may vary: if the first letter is ה h and stands for the definite article ה ha, then the word should read hasechusim or hashechusim, the cartilages. If, however, the first letter is ח ch then the word may be pronounced either chasechusim or chashchusim, chisechusim or chishchusim, cartilages.

חסחוס chasechus or chisechus also spelled חשחוס chishchus or chashchus means cartilage, cartilage forming the ear, helix, etc. The shorter form is

סחום sĕchus, sachus, and is the same as שחום shĕchus or shachus. The root of the term is חום chus, bend over; hence the derivative סחום, שחום or חסחום, חשחום cartilage, that which is pliable. In the *Tabulae* (VI, 5) this term is used in the adjectival form to designate the temporal bone.

For סחום or חסחום see Bchoroth, VI, 1, etc. For חום see Jastrow.[6]

Lines 18-19:

". . . תיק הומח, tkeck hamoah, קדרות המוח chederath hamoach, theca & olla capitis. . . ."

תיק הומח tkeck hamoah.—The letters of the second word of the term are reversed, the term being תיק המוח and its proper transliteration is theyk or thik hamoach. תיק theyk or thik is the Hebrew adaptation of the Greek θήκη, meaning casing, sheath; המוח hamoach means the brain. Thus תיק המוח means the casing of the brain or cranium. The ה and ח in המוח are hardly distinguishable. For תיק see Kiliam XVI, 8. קדרות המוח chederath hamoach. קדרות chederath should properly be transliterated kderoth or kidroth meaning pots, pots of, but it seems as though here the more fitting singular form was used as found in the transliteration, viz., קדרת chederath (better transliteration is kderath or kidrath), which corresponds to its Latin equivalent olla. By way of contrast to the preceding term, here the word המוח hamoach and its transliteration are both correct. Thus קדרות המוח means the pots of the brain or קדרת המוח the pot of the brain, olla capitis, a synonym of the preceding equivalent for cranium. The Hebrew equivalent as used today is גלגלת gulgoleth. Vesalius quotes this term from Avicenna in his marginal note on p. 233.

Cf. Tabula V, 1.

Line 20:

" Suturae . . . שלבים scelauim."

The proper transliteration is shlabim meaning mortised boards, steps of a ladder, plural of שלב shlav or shalav, the derivative of the root שלב join, fit in with mortise and tenon. Compare the synonym with מחוברים mechubarim, Tabula VI, 1.

For שלב see Jastrow,[6] Taanith Yerushalmi, IV 68.

A 2, 3:

" Sutura coronalis . . . הכלילי hachlilij, קשתיי chascthij, arcualis. . . ."

הכלילי hachlilij. The proper transliteration is haklili; literally it means the circular, the coronal, from the word כליל kalil, klil or כלילא klilah meaning circle, wreath, crown. The equivalent of sutura is not given.

For כליל see Targum Yerushalmi II. Exodus XXV., 11; Targum Numeri, VI. 7.

קשתיי chaschthij. Its proper transliteration is kashthii, meaning bow-like,

arcuate, from the word קשת kesheth, bow, and corresponds to arcualis. The equivalent of sutura is missing here too.

Compare these two terms with the synonym כתרי kethari (or kithri), Tabula VI, 2. ". . . λαμβδοειδὴς . . . למדיי . . . lamdij . . ."

A better transliteration is lamdii, meaning lambda-like or lambdoid, lamed-like or lamedoid. למד lamed is the name of the Hebrew letter ל l, the term being a direct adaptation of the Greek λαμβδα. The equivalent of sutura is again omitted.

Cf. the synonym התית hateth, Tabula VI, 3.

Apparently the *Fabrica* aims to correct the term ט t used previously in the *Tabulae* which had no resemblance in sound to the Greek Λ but would resemble it in appearance when reversed.

C 3:

" Sagittalis sutura . . . חציי checij, שפודיי scefodij, nerualis . . ."

חציי checij. A better transliteration is chitzii meaning arrow-like, sagittal, from the word חץ chetz, arrow. The equivalent of sutura is missing here also.

Cf. this adjectival form with the substantival החץ hachetz in Tabula VI, 4.

This term is given in the 1555 edition of the *Fabrica* as החיי checij, i. e., the transliteration is the same as here but the Hebrew equivalent reads hachiyi, thus not only has the צ tz been left out, but the definite article ה ha is added to the word. It is not easy to tell whether this addition is due to the printer or whether it was an attempt to specify the term חציי chitzii, sagittal, as החציי hachitzii, the sagittal.

שפודיי scefodij. Its better transliteration is shfodii or shfudii, meaning spit-like, pointed, saggital, from the word שפוד, שפוד, שפודא שפודא (shfud or shapud, shfudah or shapudah), spit. The root is שפד, chip, point, pierce. The equivalent of sutura is again absent. We have thus two synonyms as equivalents of saggital just as הכלילי haklili and קשתיי kashthii are synonyms of coronal.

For שפוד, See Psachim VII, 1 and 74a.

D 2, 3:

". . . temporales, squamaeformes. קלפיים chelaphijm."

Its proper transliteration is klafiim, the plural of קלפיי klafii, meaning scale-like, squamous. The singular noun קלף kelef, klaf, means split parchment. The root קלף means peel.

Compare with its synonyms שחוסי shchusi Tabula VI, 5 and α 2, 3, below. Einhorn uses the term עצם הרקה etzem harakah, the bone of the temple. the temporal bone.

CHARACTERVM, QVI TRIBVS VNIVERSVM SCELETON EXPRIMENTIBVS FIGVris adhibentur, Index.

TRIBVS præcedentibus figuris (quas integras nuncupare ſoleo) ijdem ferè inſcribuntur characteres. quanquã ſi quis illarum alicui peculiaris tantum fuerit, ex numero prompte obſeruabitur, quem ſingulis characteribus modò in Indice ſubijciã, quo potiſſimùm inſtituti oſſiũ nomina ſimpliciter aſcribere: primùm ea collocaturus, quibus toto ſermonis contextu præcipuè utor: dein Græca, mox (ſi quæ alia ſint) Latina probationibus recepta autoribus, idq; ita ut ordo hic cuim quandã habeat. His ſuccedẽt Hebræa, ſed & aliqua ex parte adhuc Arabica ex Hebræo Auicẽnæ interprete propemodum omnia, inſignis medici mihiq; ſimiliaris amici Lazari Hebræi de Frigetis (cum quo in Auicennã uerſari ſoleo) opera deſumpta. Atq; illis nominibus ideo Latinas literas ſubiungendas duxi, quòd horum pleraque in Arabum libris Latinitate donatis occurrant: ac proinde etiã merito poſt hæc locũ habebunt alia in Latinis Arabum interpretibus paſſim obuia, ſimul cum ijs quæ in ſcholaſticis (ut dici gaudẽt) doctoribus, noſtræq; ætatis manualium medicorum libris leguntur, non minus ſanè quàm nomina Latinis recepta autoribus ſedulò expendenda. Oſa itaque Græcis nominatur ὀστᾶ, Latinis uerò os. Hebræis autem עצם bezem. Cartilago autem χόνδρος, חזהזסיס baſcecbuſim. Cæterum oſſium nomina opportunè auſpicabimur à capitis oſſibus ſeu caluaria, quæ Græcis dicitur κρανίον, λέβης, λοβὸς, καυλία, σκαφίον. Calua, cerebri galea, atque ita nonnulli totam capitis oſſium ſedem uocant cerebrum amplexantem, octoq; oſſibus efformatam. aliqui uerò eam duntaxat, quæ crinibus ornatur. cuius circulus περιφέρεια & πρόσωπον nuncupatur. קדקדת המוח tkech hamoah, קדורת המוח chederath hamoach. theca & olla capitis, teſta capitis, & ſcutella capitis, aſoan.

Suturæ, quibus capitis oſſa inuicem committuntur, generatim uocantur ῥαφαὶ, שלבים ſcelauim. ſenan, direzan, adoren, compoſa.

A 2,3 Sutura coronalis, στεφανιαία. תבלילי bachlilij, קשתיות chaſcthij. arcualis, futura puppis.

B 2,3 Græcorũ maiuſculum Λ referẽs futura, λαμβδοειδὴς, & υ ab ſimilitudine ὑπσιλοειδὲς. לבדיי lambdij. laude, bypſili, futura proræ.

C 3 Sagittalis futura, βελοειδὴς, ἰακβοειδὴς. Inſtar teli, ueru, aut uirgæ ſecũdum capitis longitudinem prorepens futura. חציי chetzij, שסודיי ſcefodij. nerualis, idq; potiſſimùm ubi hæc coronali commutitur: qui locus etiam ʒcudech, idq; imprimis Meſuæ uocatur.

D 2,3 Hæc compaʒ ouatæ futuræ imaginem non exprimens cum ſua cõiuge uocatur, futuræ ſquamarum modo inuicem cõmiſſæ, λεπιδοειδὴς κροταφία, temporales, ſquamæ formes. שלפיים chelaphijm. corticales, mendoſæ. Reliquæ autem caluariæ futuræ proprijs deſtituuntur nominibus. cuiuſmodi uerò illæ ſunt, non eſt quòd hic prolixius denuò repetam.

α 2,3 Hoc os unà cum ſuo coniuge, uerticis oſſa uocatur, itemq; βρέγματος, κορυφὴ. ſunt quibus ſyncipitis oſſa nuncupantur. עצם הקדקד bezem hachodchod. nerualia, paria, arcualia: quanquã alij ita inʒ alia nuncupent oſſa. parietalia, quo nomine nonnullis temporum oſſa dicuntur. oſſa rationis, ſeu cogitationis.

β 1,2,3 Frontis os, μετώπου, quibuſdam ſincipitis. עצם החציי bezem hamezzech, coronale, os puppis capitis, os inuerecundum, os ſenſus communis.

γ 2,3 Occipitis ſeu occipitij os, ἰνίου. עצם העורף bezem hakoreph. laude os, pyxis os, os proræ, os memoriæ. Sunt qui & baſillare (quòd magnam capitis portionem cõſtituat) nuncupent, etiamſi id nomen cunciformi oſſi priuatim inditum fuerit.

δ 2,3 Id os cum ſuo pari, temporum oſſa, κροταφῖται, κυβοειδὲς, κιβωτοειδὲς πυραμοειδὲς. aliqui etiam πλινθίδια, lapideꝰ, lapidoſi. תחרעים hazedabim, עצמות האבנים hazzamoth haabnijm. auricularia, etiamſi id nomẽ duobus oſſiculis accommodari poſſit auditus organi conſtructionem ingredientibus, & in ſcamno cim ſecunda figura cubitis innititur, q & expreſſis. Quandoquidem q̃ oſſiculum notat incudi aut molari dentiaſſimulatum, uerò id quod malleolo aut ſemoris oſſi comparamus. Quum itaq; eiuſmodi oſſicula priſcis Anatomes profeſſoribus fuerint incognita, non mirum eſt illa etiã nominibus deſtitui. Cæterũ temporũ oſſa quibuſdam tympanũ, mendoſa, pariet alia, dura, armata dicẽtur.

φ 2 In temporis oſſe proceſſus ſtyloideus ac mammillaris reſertur. στυλοειδὲς, μαστοειδὲς, πλάκιον. cochlear capitis. חזיר הראש chazir harosch. os calamitum ſagittale, clauale, acutum.

α 2, 3:

". . . uerticis ossa . . . עצם הקדקד hazem hachodchod . . . parietalia . . ."

The correct transliteration is etzem hakodkod. עצם etzem means bone, קדקד kodkod means head, skull, vertex, summit. Thus עצם הקדקד means literally the bone of the vertex of the skull, i. e., the parietal bone. This term is not mentioned in the *Tabulae*.

For קדקד see Sifré, Deuteronomy 35.

β 1, 2, 3:

" Frontis os . . . עצם המצח hezem hamezzech . . ."

The correct transliteration is etzem hametzach. עצם etzem means bone, המצח hametzach means the forehead. Thus עצם המצח means the bone of the forehead, i. e., os frontis.

For better transliteration see Tabula V, 2.

γ 2, 3:

" Occipitis . . . os . . . עצם העורף hezem hahoreph . . ."

The more correct transliteration is etzem haoreph. עצם etzem means bone, haoreph means the hind part of the head or neck. Thus עצם העורף means here the bone of the back of the head, i. e., os occipitis.

For partial omission of the term, see Tabula V, 3. This term also illustrates well the difficulty in deciphering such letters as ה h and ח ch ת th and ף f.

δ 2, 3:

". . . temporum ossa . . . lapidosa. הצדעים hazedahim עצמות האבניים hazzamoth haaunijm . . ."

הצדעים hazedahim. The correct transliteration is hatzdaaim, the dual form, or hatzdaim, the plural of צדע tzeda, meaning temple. Thus הצדעים means the temples, here the bones of the temples, the word " bones " having been omitted.

For צדע or צדעה see Jastrow,[6] Niddah 30, etc. Cf. Tabula VI, 5 and term on line 14 above.

עצמות האבניים hazzamoth haaunijm. The more correct transliteration is atzamoth haavniim. עצמות atzamoth is the plural feminine of עצם etzem, bone, האבניים haaviniim is the plural masculine of האבניי haavnii, the stone-like, an adjectival form of אבן even, stone. Thus the feminine noun is used with a masculine adjective.

Note that the temporal bones have already been designated above under D 2, 3. עצמות האבניים means then the stone-like bones, i. e., ossa lapidea.

ε 2:

" In temporis osse processus styli . . . calcar capitis מהר חומין chemo marhezz . . . sagittale . . ."

In the edition of 1555 (P. 206, D ϵ2) one finds the same transliteration which corresponds to an entirely different Hebrew equivalent consisting of two words, viz., חמו מרחין. In either case both the equivalents and their common transliteration have no meaning at all in so far as one could make out. Something must have happened to the term in transcribing or printing it. As it stands, it is nonsensical, but at least in the 1555 edition the transliteration corresponds with the equivalent. Vesalius uses it to mean the styloid process. By rearranging the letters one could obtain a sensible Hebrew term either החין מרום hachetz merom or החין ממוח hachetz mimoach.

החין מרום hachetz merom. החין hachetz means the arrow, מרום merom means from above. Thus החין מרום means the arrow from above, i. e., the arrow (the styloid process) pointing from above downwards.

החין ממוח hachetz mimoach החין hachetz means the arrow, ממוח mimoach means from (of) the brain (skull). Thus the arrow (-like styloid process) of the skull.

P. 167/ζ, 2, 3:

"Temporis ossis processus . . . mamillaris, עצם פטמיי hezem potmij."

A better transliteration is etzem potmii. עצם etzem means bone, פטמיי potmii is the adjectival form of פטמה pitmah or פטם pitam, meaning pestle, mortar, a protuberance on the blossom end of fruits having the appearance of a pestle seated in a mortar. Thus עצם פטמיי means pitam-like bone, i. e., mamillaris. Again a feminine noun with a masculine adjective. This term, too, is not mentioned in the *Tabulae*.

For פטם see Jastrow,[6] Succoth III.

E 2, 3:

". . . basillare . . . מושב המוח moscau hamoach . . ."

The proper transliteration is moshav hamoach. מושב moshav means seat, המוח hamoach means the brain. Thus מושב המוח means the seat of the brain, i. e., the bone the brain rests on, meaning the basillary or sphenoid bone. Term used as in Tabula V, 5.

θ 2:

". . . *πτεριγοειδὴς*, עצם כנפיי hezzem chenaphij."

The proper transliteration is etzem knafii. A more correct form would be כנפי knafi. עצם etzem means bone, כנפיי knafii means wing-like, from the noun כנף kanaf, wing. Thus עצם כנפיי means the wing-like bone, this being the shape of the pterygoid plate, and corresponds to the Greek pterygoid. Again a feminine noun with a masculine adjective. The transliteration hezzem is spelled hezem above, ζ 1, 2, 3.

F 1, 2, 3:

". . . *ζυγώματα* . . . עצמות הזוג hazamoth hazogh. Ossa paris, paria . . ."

The proper transliteration is atzmoth hazug. עצמות atzmoth means the bones of, being the plural form of עצם etzem, bone, הזוג hazug means the pair. Thus עצמות הזוג means the "zug" bones, the bones of the pair, the paired bones, ossa paris, paria.

For further analysis see Tabula V, 4.

". . . mandibula, הלחי העליון halechi halelioi . . ."

The proper transliteration is halĕchi haĕlion. הלחי halĕchi mean the cheek, the cheek bone, העליון haĕlion means the upper. Thus הלחי העליון means the upper maxilla. This Hebrew term is given as the equivalent of mandibula or γενυς, both which terms Vesalius remarks are applied to either maxilla. Grammatically the term is construed erroneously since הלחי is a feminine noun and, therefore, instead of הלחי העליון halĕchi haĕlion there should be הלחי העליונה halĕchi haĕlionah. In modern Hebrew the mandible is correctly designated הלחי התחתונה halĕchi hathachthonah, "the lower cheek (bone)"; and some ‘ call it סנטר santer.

G:

"Dentes . . . שניים scinaijm . . ."

The more proper spelling is שנים and its transliteration is shinayim. שנים is the plural of שן sheyn, tooth.

". . . risorij . . . המחתכים hamechatechim . . ."

The more exact transliteration is haměchatěchim, meaning the cutters, its root being חתך cut.

". . . canini . . . כלביים או מתלעות chelauijm aut metalehoth mordentes . . ."

The correct transliteration is kalbiim o měthalĕoth. כלביים kalbiim is the plural of כלבי kalbi, canine, its root being כלב kelev, dog; או o means or; מתלעות měthalĕoth is the plural of מתלעה měthalĕah, the name given to the tooth that bites or chews the food. Thus כלביים או מתלעות is the exact equivalent of the Latin canini aut mordentes.

". . . נגואיד naghuid . . ."

This word with its transliteration seems to be Arabic and is certainly not Hebrew. Its Hebrew equivalent is given immediately below: ". . . Molares uero, Hebraeis dicuntur טוחנות tochanoh."

The correct transliteration is tochănoth. טוחנות is a feminine plural form, meaning grinders, its root being טחן, grind. Thus טוחנות is the exact Hebrew equivalent of molares.

Compare all the terms of this section G. from Dentes to molares, with the corresponding terms 1 to 4 inc. in Tabula IV, particularly the last term regarding the grammatical correctness of this and the other terms.

H 2:

". . . λαμβδοειδὲς . . . os υ aut Λ . . . עצם לאמי או למדי hezem lhami aut lamdij."

A better transliteration is etzem lami o lamdi. עצם etzem means bone: לאמי lami has no Hebrew meaning but seems to be the abbreviated form of למדי; או o means or; למדי lamdi means lamed-like or lambda-like, a direct adaptation from the name given to the Greek letter Λ which is used to designate the Hebrew letter ל l (Lamed). Thus עצם לאמי או למדי means the lamed-like or lambda-like bone, the exact equivalent of the term lambdoid bone, thus designating the shape of the hyoid bone. It is curious that the Greek letter υ (upsilon) resembles the Hebrew letter ט t. Cf. B 2, 3 also Tabula VI, 3.

I, K, L, M, & N:

". . . spina . . . שדרה scidra . . ."

A more correct transliteration is shidrah or shderah. Literally it means twisted cord, row, column; in anatomy it always means the spinal column, the spine. See Tab. VI, 7.

For שדרה see Hullin, III, 2.

". . . uertebris . . . חוליוך chulioth . . ."

The transliteration is correct, but the Hebrew equivalent is misspelled, the word really being חוליות chulioth and not חוליוך chulioch. In the *Tabulae* the spelling of the equivalent is given correctly, however.

חוליות is the plural of חוליה chuliah, loose part, something movable, link, etc., here designating specifically a vertebra. Thus חוליות means vertebrae.

Cf. Tabula VI, 8.

". . . collum. צואר או גרון zauor uel gharron."

The correct transliteration is tzavar o garon. צואר tzavar means neck; או o means or; גרון garon means throat. Thus צואר או גרון means neck or throat and corresponds to the Latin collum. In the *Tabulae* the term גרון is used. For further analysis compare Tabula VI, 9.

". . . pectoris . . . חזה chaze . . ."

Literally it means chest and is the equivalent of pectus, referring here to the thoracic vertebrae. In the *Tabulae* another equivalent is used.

Cf. below O 1, 2, 3; especially Tabula VI, 10; also Tabula IV, 8.

". . . uertebrae lumborum . . . מתנים mothnaim . . ."

Literally it means loins, hips, and refers here to the vertebrae in that region. In the *Tabulae* the equivalent used is entirely different.

Cf. Tabula VI, 11.

". . . os sacrum . . . עצם פי הטבעת hezen pi hatabahath . . ."

The proper transliteration is etzem pi (pee) hatabaath.

עצם etzem means bone; פי pi means the mouth of; הטבעת hatabaath means the ring. Thus עצם פי הטבעת means literally the bone of the mouth of the ring, the ring being here the lesser pelvis and the mouth the inlet, i. e., the sacrum. In Tabula VI, 12, the Arabic equivalent is given, but in Hebrew transliteration. Einhorn[1] calls the sacrum העצה heatzeh, a term which Vesalius applies immediately below to the coccyx.

". . . coccyx . . . עצה haaze. caudae os . . ."

The correct transliteration is atzeh, meaning backbone, spine (in general), or the last vertebrae or coccyx (when used specifically). The root is עצה, close, referring to the coccyx which closes up or ends up the vertebral column. The transliteration here given, haaze (correctly heatzeh), implies the definite article ה he which is missing in the equivalent. In the *Tabulae* עצה is used to designate the lumbar set of vertebrae while the coccyx is named differently. In modern Hebrew some[1] use עצה to designate the sacrum, while others[4] call it קיץ השדרה kotz hashidrah (or hashderah), the point or end of the spine.

For עצה see Yalkut Leviticus, 462.

It is noteworthy that practically all terms used in the *Tabulae* to denote the various vertebrae are entirely different from these.

Compare all terms in this section from I to O with those in Tabula VI, terms 9 to 13 inclusive.

O 1, 2, 3:

" Pectoris os . . . עפם החזה hezem hehace. thorax . . ."

The proper transliteration is etzem hechazeh. Moreover, the first word of the term is misspelled עפם efem which is meaningless and should be עצם etzem, then meaning bone. החזה hechazeh means chest. Thus עצם החזה means the bone of the chest, i. e., the sternum. In Tabula IV, 8 the first word of the term is missing. One may add that the letters ה h and ח ch of this term are hardly distinguishable again.

Some[1] call the sternum מפתח הלב maftheach halev, מפתח maftheach meaning key, הלב halev, meaning the heart. Thus מפתח הלב means " the key (bone) of the heart."

P 1, 2, 3:

". . . ξιφοειδὴς, ensiformis עצם בדלי רחב hezem bedelij rachauch, גרוני gheroni, אלחנגרי alchangri, quibus nominibus universum, pectoris os donatur."

עצם בדלי רחב hezem bedelij rachauch. The correct transliteration is etzem bdalii rachav. עצם etzem means bone; בדלי bdalii is the adjectival form of בדל bdal or badal, a piece, a separate and distinct part; רחב rachav means wide. Thus עצם בדלי רחב means the wide separate bone, a description which would rather befit the sternum than the xiphoid process as the latter's characteristic is its dagger-like, pointed shape, hence its Arabic name Alchangri which is found below in Hebrew transliteration and means literally dagger.

Ι,2,3 *T*Corporis ossis processus, uberis papillã referẽs, μαστοειδὴς, mamillaris, עצם מכשירי bezẽ mekaschirj potmij.

Β 2,3 Os cæco comparatum. σφηνοειδὲς. Galeno τὸ πρὸς ὀπίσθιον ἐκτὸς (etiam si palatum uix contingat) cæcũ scribitur, πλόκιμον. Cuneiforme palati os, basillare, quanuis sic etiam appellent occipitis os. עצם הגלגל moscau hamoach. Baxillare, paxillum, os colatorij, os cribratum, caulla: quam & ita talum quoque uocent. 2 Sedes caluariæ, quam lapidosam dicimus.

β 2 Cæciformis ossis processus, uespertilionũ alis assimilati. πτερυγοειδὲς עצם בנתי bezzẽchenaphij.

F 1,2,3 Hæc sedes simul cum sua coniuge in altero latere, uocatur ossa tugalia. ζυγώματα, ζυγωδῆ, ζυγάδη. עצמות הגג hazamoth hazogh. Ossa paris, paria, quæ nomina illi etiam temporũ assribũt ossibus, ansæ ossium temporum, arcualia ossa.

Superioris maxillæ duodecim ossibus nullum inscripsimus characterem, quòd priuatis destituantur nominibus, quanquam interim septum narium, nonnullis crista os nuncupetur. Cæterum superior maxilla dicitur γένυς, mandibula. הלחי הקלוקן balechi habelioi. quæ nomina & inferiori maxillæ G in trib. figuris notatæ accõmodãtur, quã Halyabatis interpres priuatim Faucẽ uocat.

G. Dentes, ὀδόντες, שיניים scinaijm, plurimum in utraque maxilla sedecim figuntur, quorum quatuor medij, antetores, σμιλοειδῆ, incisorij uocãtur. τομεῖς, ἀκτῖνες, λύτηρες, γναθικοὶ. risorij, quaterij. תחוכים bachechim quadrupli. Verũ duo medij, priuatim duales illis appellãtur. Quiutrinq; incisorijs proximus est, caninus uocatur, sũtq; ita utriusq; maxillæ duo canini. κυνόδοντες. בלעים או בוהלפות chelaijm aut metaleboth. mordentes, hos quidã quoq; risorios uocauerunt. Quinq; autem utrinque insequẽtes, molares appellantur. μύλιοι, ὀμικοὶ. molares, maxillares, paxillares, Cicero Genuinos, quo nomine alij eos appellant, qui post pubertatem ferè crescunt, ac Græcis σωφρονιστῆρες, ἐκτῖνες, φίλιγνοι uocantur: nostris dentes sensus ac sapientiæ, dein cayseles. בוחרי nagbuid. ἐπιγενεῖδι, nanged, albalm. Molares uerò, Hebræis dicuntur טוחנות tochanob.

H 2 Os y referens. ὑοειδὲς, ὑπσιλοειδὲς, καρδιοειδὲς, ψαφοειδὲς, φαρυγγικὸν. os y aut Λ imaginem exprimens. עצם לשוני או לאמדי bezem lhami aut lamdj. Linguæ os, gutturis os, os laude, os morsus Adam. Auicenna Interpres Capite de Gutture habet: Alfuc os habẽs quatuor latera, duo inferiùs, duo superiùs, quod non obiter Anatomes studioso obseruandum uenit.

I K, L, M, & N His characteribus, in tribus figuris ferè conspicuis dorsum notatur, quod ῥαχίτης, ῥάχις, spina, tergũ, hominis carina, כדורת scidra nuncupatũ, multis extruitur uertebris, σπονδύλοις, חלזרי chuliotb. Verticulis, ossibus fusi, quæ in posteriori sede acutũ educũt processum, κόκκυξ, Simiæa, adsenascem senasem uocatur. Cæterum ab I ad K indicatur ceruix. τράχηλος, αὐχὴν. collum. שדרה או גרון zauor uel gharron. Tenon atblas, quod nomen alij septimæ ceruicis uertebræ dant ex taxat tribuunt. Porrò à K ad L uertebræ insigniuntur thoracis, θώρακος, aliquando & νῶτος πνευμονικὸν. pectoris, interdum dorsi simpliciter. חזה chaze. interscapilij. Ab L ad M uertebræ lumborum. ὀσφύος, λαγὼν. renum. בוכיים mothnaim. alchatin. Ab Med N os sacrũ proponitur. ἰερὸν, πλατύ. latum, עצם הכסלת bezen pi batabahath. lumbare, ossa cinctũ, clauũ, alagas, agit, abbans, abbaũ, uetula, osfaniũ, osfanũ, quæ nomina coccygi ossi ab aljs assribũtur. N inscribitur coccyx os. κόκκυξ, σπονδύλιον, ὀξύτατον. עצה hazze. caudæ os, albosos, extra reliqua, quæ ossi sacro ex quorundam interpretum sententia tribuimus nomina.

O 1,2, 3 Pectoris os. στέρνον. quo nomine nonnulli superiorem ossis partem appellant, inferiorem τὸ ξιφοειδὲς nuncupantes עצם החזה bezem hehace. thorax, asser, cossos, scutum cordis.

P 1,2,3 Mucronata pectoris cartilago, ensi cõparata. ξιφοειδὲς, ensiformis. עצם כלי חזה bezẽ kelelij hachaz. כדורי gheroni, אלחנגרי alchangri, quibus nominibus uniuersum pectoris os donatur. Malũ granatũ ensifoidis, cultralis, epiglottalis cartilago, scutũ, clypeus oris stomachi, medium furcule inferioris. 1,2,3. & cæt. usque ad 12. In tribus figuris duodecim thoracis costæ tam ueræ ac legitimæ, quàm nothæ spuriæ ue indicantur. πλευραὶ. צלעות zelaboth.

Q 1,2, 3 Clauiculæ. κλεῖδες. claues, iugula sunt qui & has humeros appellarunt. כתף scechẽ. Furculæ, aut priuatim furculæ inferiores, quas ab humiliori pectoris ossis sede, ita distinguunt.

R 1,2, 3 Scapula. ὦμος, ἐπωμὶς, πτέρνη, πλάτη. Scapula, Latinis plerunque etiam humerus nuncupatur. scopulum opertum, scoptula. כתף chatheph. Spatula, clypeus & scutum pectoris. Cæterum R in tribus figuris, superior scapulæ insignitur processus, quem summum humerum ferè uocant, ἀκρώμιον, ἀκρωμιαῖον. ait Hippocrati & ἐπωμὶς ἀνω. Galeno etiã πτερυγοειδὲς dictus. חדרי חתים schedri hathim. ossa cubiti. מי פי baboreub. Rostrum porcinum, caput scapulæ. alachatin, χοιρόκρανον, char, algarab, distrectũ. Processus autem scapulæ interior inferiorue, in gracilem figuram μικρὸν

One would, therefore, be perhaps justified in transcribing the word רחב rachav, wide, into חרב cherev dagger, and read then עצם בדליי חרבי etzem bdalii charbi instead of עצם בדליי רחב etzem bdalii rachav, meaning now the separate dagger-like bone. This agrees perfectly with the Arabic and Greek equivalents as well as with the actual shape of the bone, but it would deviate much from the original Hebrew equivalent and its given transliteration.

גרוני gheroni. Its better transliteration is groni and means of the throat. here cervical, being the equivalent of the Latin colli.

אלחנגרי alchangri. It is the Arabic equivalent of dagger in Hebrew transliteration. Vesalius calls both this and the preceding terms pectoris os.

Cf. Tabula IV, 8, 9; also Tabula VI, 9.

The manner in which the three terms in P 1, 2, 3, were used as equivalents suggests that Vesalius did not use them correctly or definitely. It seems that the following usage is best:

1. עצם בדליי רחב, the separate wide bone, is the body of the sternum and not the xiphoid process.

2. גרוני, the cervical (part), is the manubrium.

3. אלחנגרי (Arabic), the dagger-like (part), is the xiphoid process.

". . . costae . . . צלעות zelahoth."

A better transliteration of the term is given in the *Tabulae*, viz., tzelaoth. meaning ribs, its singular being צלע tzela, rib.

Cf. Tabula V, 6.

Q 1, 2, 3:

" Claviculae . . . סכם scechem. Furculae . . ."

The transliteration scechem, properly pronounced shechem, invalidates the spelling of the equivalent which should accordingly be spelled שכם, meaning shoulder or back of shoulder. In that case this term is too general to designate the clavicle. If, however, we take the term סכם as given, then its transliteration is sechem of the verb סכם sachom, unite, combine, and it then is more acceptable as meaning the uniting bone or link between the scapula and the sternum, that is, the clavicle. In modern Hebrew the equivalent for clavicle is בריח bariyach, the bolt, the bar, this simulating more our suggested interpretation. In the *Tabulae* another equivalent is given and differs entirely from those mentioned.

For סכם see Makkoth III, 10. Cf. Tabula IV, 5.

R 1, 2, 3:

" Scapula . . . כתף chatheph."

The proper transliteration is catheph, meaning ordinarily shoulder, here shoulder-blade. Einhorn [1] designates the scapula specifically as שכמה

shichmah, a derivative of שכם shechem, shoulder, the back part of the shoulder.

Cf. Tabula VI, 6; also Tabula IV, 7.

λ:

". . . *ἀκρώμιον* . . . אגרסו חרטום agrasso chartom, פי העורב pi hahoreuh. Rostrum porcinum . . ."

אגרסו חרטום agrasso chartom. אגרסו agrasso is not a Hebrew word and as such is meaningless. חרטום chartom means beak and is the equivalent of the Greek *ἄκρον*, point.

פי העורב pi hahoreuh. The proper transliteration is pi (pee) haorev. פי pi means the mouth of, העורב haorev means the crow. Thus פי העורב means the mouth of the crow and corresponds to Galen's term coracoid for which Vesalius prefers the term rostrum porcinum. Vesalius' note as to the different usage of these equivalents by Hippocrates and Galen, respectively, is very interesting.

Cf. Tabula IV, 6.

P. 168 μ:

". . . עין הכתף haijn hacateph. Oculus scapulae . . ."

The proper transliteration is eyn hacatheph. עין means eye. הכתף hacatheph means shoulder, shoulder-blade. Thus עין הכתף means the eye of the shoulder-blade and is the exact equivalent of the Latin Oculus scapulae, i. e., the glenoid cavity. Vesalius, however, fails to mark it in his figures or specify it in the Characterum Index.

Cf. Tabula IV, 7.

S 1, 2, 3:

"Humerus . . . קנה הזרוע chane hazeroha, עצד hazad. Paruum brachium, canna brachij . . ."

קנה הזרוע chane hazeroha. The proper transliteration is kneh hazroa. קנה kaneh means reed, stick or anything resembling these. זרוע zroa means arm, forearm, arm and forearm. Thus קנה הזרוע means the stick of the arm, designating the humerus. In the 1555 edition of the *Fabrica* קנה הזרוע is misspelled and run together as one word קנההזריע, but its transliteration remains correct. However, in the next item below, the second word of the term, הזרוע appears correctly again. Why Vesalius calls the humerus Parvum brachium is surprising since the humerus is the largest of the bones of the upper extremity. In modern Hebrew one sometimes uses זרוע alone to designate the humerus.[1] Another variant of this term is אזרוע ezroa.[4]

Cf. Tabula IV, 10 and 11; also Tabula V, 12 and 13.

עצד hazad. A meaningless word in Hebrew, nor does the transliteration correspond accurately to the equivalent.

T, V 1, 2, 3:

". . . Cubitus, ulna . . . זנדין zandin זרוע zeroha, שתי עמודים scete hamudim . . ."

זנדין zandin. This is the Hebrew transliteration of the Arabic equivalent of the bones of the forearm, meaning pillars.

For full discussion see Tabula IV, 12 and 13. זרוע zeroha. See above S 1, 2, 3. זרוע here means forearm as is evident by the following specifying synonym. In the *Tabulae*, however, זרוע is used to designate only the humerus. See Tabula IV, 10.

שתי עמודים scete hamudim. The correct transliteration is shthey amudim. שתי shthey is the feminine word for two. עמודים amudim is the plural of עמוד amud, pillar, column. Thus שתי עמודים means two pillars, the Hebrew equivalent of the preceding Arabic zandin, and being in connection with the upper extremity, the term designates radius and ulna. One should note that עמוד is a masculine noun, hence the use of the feminine numerical form שתי with this word is a definite grammatical error. The masculine numerical form for עמודים is שני shney and thus should be שני עמודים. In modern Hebrew the forearm as a whole is called אמה amah.

X 1, 2, 3:

" Superius in cubito os, radius . . . עמוד העליון hamud haelion . . ."

The correct transliteration is amud haelion. The definite article ה ha which is prefixed to the second word is superfluous unless one adds the definite article to the first word, in accord with the Hebrew grammar, thus reading the term העמוד העליון haamud haelion.

עמוד amud means pillar, column; עליון elion means upper, superior. Thus עמוד העליון means upper or superior pillar, here used to designate the radius. In the *Tabulae* Vesalius gives it as the equivalent of ulna.

Cf. Tabula IV, 12 and 13.

Y 1, 2, 3:

" Cubiti inferioris os, ulna . . . עמוד התחתון hamad hatachthon . . ."

The correct transliteration is amud hathachthon. The remark above made regarding the definite article added to the second word may be applied also here.

עמוד amud means pillar, column; תחתון thachthon means lower, inferior. Thus עמוד התחתון means the lower pillar, the term being here applied to the ulna. In the *Tabulae* this term is used for radius.

For full discussion of these terms and their Arabic equivalents see Tabula IV, 12, 13. Cf. also Tabula V, 12, 13.

Z, Z 1, 2, 3:

". . . καρπός . . . רסג rasegh . . ."

The proper transliteration is reseg, as given in the *Tabulae*. רסג as such

has no meaning in Hebrew, but when for the last letter ג g one substitutes ק k, thus making it רסק resek, then it is the collective term for bony pieces, and here means carpus.

For full discussion of the term see Tabula IV, 14. Also cf. רסג below as well as Tabula IV, 20.

Γ 1, 2:

". . . *μετακαρπιον* . . . מסרק כף היד masrech chaph haiad . . ."

The exact transliteration is masrek kaph haiad. מסרק masrek means comb; כף kaph means spoon, spoon-like, palm; היד haiad means the hand. Thus מסרק כף היד means the comb of the palm of the hand, referring to the metacarpals which together with the carpus form a comb-like structure. In the *Tabulae* the general term מסרק masrek is used.

See Tabula IV, 15. Also cf. below מסרק הרגל as well as Tabula IV, 22.

Δ, Δ 1, 2, 3:

" Digiti . . . אצבעות hezbahoth . . ."

The correct transliteration is etzbaoth. אצבעות is the plural of אצבע etzba, finger. Thus אצבעות means fingers, digiti. In the *Tabulae* the letters of this term are completely reversed תועבצא.

See Tabula IV, 16.

Θ 1, 2, 3 ο:

". . . ilium os . . . עצם הכסל hezem hachesel . . ."

The correct transliteration is etzem hakesel. עצם etzem means bone; הכסל hakesel means groin, loin. Thus עצם הכסל means the bone of the groin, i. e., the ilium. In Tabula V, 8, Vesalius uses a different term.

For כסל see Bkoroth 40a.

ϖ:

". . . עצם הירך hezem haiarech, coxae os . . . Althauorat . . . femoris os . . ."

The correct transliteration is etzem haiarech. עצם etzem means bone; הירך haiarech means the thigh. Thus עצם הירך means the bone of the thigh, i. e., femur.

For full discussion of the term see Tabula V, 9. Vesalius' designation of the term forces us to assume that either the letter which marks the structure in question is not placed properly, or that the equivalent is not properly used.

ρ:

". . . pubis os . . . גבי הערוה gabe haherua, אלעאנא helhaua . . . עצמות גב הערוה hazamoth ghau haherua."

גבי הערוה gabe haherua. The proper transliteration is gabey haervah.

גבי gabey is the plural form of גב gav, back and side (German Ruecken); העורה haervah means the shame, the figurative name of the genitalia. Thus גבי העורה means the back and side part (Ruecken) of the genitalia, i. e., the pubic bones.

For full discussion see Tabula V, 7. Cf. also below עצמות גב העורה. Note that in the *Tabulae* the singular גב העורה gav haervah is used.

אלעאנא helhaua. The transliteration does not appear to correspond to the term. This term is meaningless in Hebrew and seems to be Arabic, for Vesalius remarks about it: . . . os Hebraeis dicitur: עצמות גב העורה hazamoth ghau haherua.

עצמות גב העורה hazamoth ghau haherua. The correct transliteration is atzmoth gav haervah. עצמות atzmoth is the plural of עצם etzem, bone; גב gav means back and side; העורה haervah means the shame, genitalia. Thus עצמות גב העורה means the bones of the back and side of the genitalia, i. e., the bones forming the back and side of the genitalia, the pubic bones. The difference between the preceding גבי העורה and this term seems to consist only in that the former refers to the pubic arch as a whole, while the latter specifies the bones forming the structure. Another assumption would be, in view of Vesalius' remark "Verum universum os Hebraeis dicitur . . .", that this term means in general the innominate bones.

Cf. above גבי העורה and Tabula V, 7.

In the 1555 edition, the last letter of the last word of the term העורה is wrongly replaced by another, thus instead of עצמות גב העורה it is written עצמות גב הערות. The transliteration, however, suffered no change.

Λ 1, 2, 3:

"Femur . . . פחד הירך pachad, haiarech . . . Os coxae . . ."

פחד pachad means fear; הירך haiarech means thigh, femur. Thus פחד הירך means the fear of the femur, which is an absolutely nonsensical term. If, however, the ד d of פחד be changed into the other lingual ת th, the word then becomes פחת pachath meaning pit, cavity, hollow. Thus פחת הירך signifies the pit or hollow of the femur, or acetabulum. But in Latin the equivalent Vesalius gives is os coxae. Besides, in his figures Vesalius definitely marks the femur itself by Λ, and thus the difficulty still remains.

Cf. Tabula VI, 14; also Tabula V, 10.

Ξ 1, 2, 3:

"Patella . . . עין או מגן הארכובה hayn aut maghen haharcuba . . ."

The correct transliteration is eyn o magen haarkuvah. עין eyn means the eye of; או o means or; מגן magen means shield; הארכובה haarkuvah means the knee. Thus עין או מגן הארכובה means the eye or the shield of the knee, i. e., the patella. In the *Tabulae* ארכובה designates malleolus. In modern Hebrew the patella is called פיקת הברך pikath haberech.

For ארכובה see Hullin IV, 6, 14. Cf. also Tabula IV, 17.

tus, dicitur ἀγκωνίδιος, & Galeno interdum κερκοειδὴς, σημοειδὴς. Anchoræ formis, Cliterã referẽs. ꝓcessus. קיר תחתון baijn hacateph. Oculus scapulæ, quo etiã nomine scapulæ spina nũcupatur.

S 1,2,3 Humerus, seu brachij os, βραχίων. Brachiũ, sunt quibus ulna uocetur. קנה תחתון chane hazeroha, עזר bazad. Paruum brachium, adiutorium brachij, canna brachij, asetb.

T, V 1, 2,3 Totahæc sedes, cubitus nũcupatur. πῆχυς, ὠλένη, ὦλεκρανον. Cubitus, ulna, quæ nomina etiã inferiori huius sedis ossi tribuũtur. צרין zandin, זרוע zeroha. קוד עמורים scete hamudim. Alsad, aseid, alsabad. X 1,2,3 Supertius in cubito os, radius nobis appellatũ. לטוש חמלון עמוד hamud haelion. Focile minus brachij, canna, arundo minor brachij.

Y 1,2,3 Cubiti inferioris os, ulna nobis dictum, eiſdemq; cum toto cubito uocibus donatum. πῆχυς. עמור התחתון hamud hatachthon. Focile maius brachij, cãna, ac arũdo maior et inferior brachij.

υ. Humi processũ in secũda insignitum Græci nuncupant ὠλεκρανον, κύβιτον, ἀγκῶνα, Latinorũ qui

ξ. dam Gibberũ. Additamentũ necatũ. Processus autẽ ξ insignitus, ac stylũ referens, συλοειδὲς.

Z, Z 1, 2,3 Brachiale. καρπὸς. Palma quibusdam. רסג rasegh. Rascha, raseta, ascam, ossa rasete.

Γ 1,2 Postbrachiale. μετακάρπιον, ὠνάριον, εἶδος, πλατος. permultis palma, pectẽ. חיד mafrech chaph haiad. alselanuat. Δ, Δ 1,2,3 Digiti. δακτυλοι. אצבעות bezbahoth.

Θ 1,2,3 Ossa sacri ossis lateribus commissa, quorũ utrinq; unũ est, in tres ucluti sedes (etsi continuũ sit)

o. à dissectionis professoribus distinctũ, ac prima quidẽ o insignitur, ilium os nuncupata. λαγόνες.

ש. עצם הטפל bezem hacheſel. Alhartas, anchæ, interdũ lũbare. Secũda sedes mediaq;, ac ש insignita, coxendicis os nuncupatur. ἰσχίον. עצם החיר bezem haiarech, coxæ os, quibus nominibus pleriq; totũ os etiã uocatur. Althauorat, pixis os, femoris os, secundalde perperam. Tertia sedes, anteriorq;, ac ρ insignita, pubis os uocata est. ἤβιον, pectinis. גביה חשיוה gabe hahcrua, בלעאא belbaua. Penis pudibundi, fenestratum os, quod etiã illi femoris os subinde appellitãt. Verũ uniuersum os Hebræis dicitur עצמות גבחשיוה bazamoth ghau haherua.

ϱ 1,2,3 Coalitus pubis ossiũ, uerũm priuatim cartilagὸ hic insignitur, eorũ ossiũ unionẽ interuenientis.

Λ 1,2,3 Femur, seu femoris os, semen. μηρὸς. פחד הירך pachad, haiarech. Os coxæ, coxa, agis, anchæ os.

τ 1,2,3 Exterior femoris processus, qui rotator, & natis ferè nũcupatur, προκαντερικὸς μῦς, γλουτὸς. Malũ

υ. granatũ testiculorũ, tharuca, trachametra maior. Minor uerò interiorq; processus, υ insignitur.

Ξ 1,2,3 Patella. μύλη, πυξὶς, μυλακρὺς, κύγχη, κύγχος, ἐπιγονατὶς. Mola, scutiforme os, genu rotula. השתכח בין איבין bayn aut maghen haharcuba. Oculus genu, polus, adaicon, rasga, alrasafe, arresafu.

Π, Σ 1,2,3 Hæc pars uniuersa Celso Crus nũcupatur, quanq; Galeno σκέλος dicitur, quicquid à coxẽ dicitis esse, ipsis ue inguinibus, ad extremũ usq; digitorũ pedis pertinet: femur nimirũ, tibia, & pes ipse. Nominatur itaq; secus pars hæc Π & Σ interſepta, tibia. κνήμη. שוק seoch. quibus nominib. lu

Φ 1,2,3 ius quoq; sedis grandius exterius q; os obuiũ est, quod tibiæ os ferè nũcupamus. πελέκυς, & interdum κατακνήμιον appellatũ, עצם התוויל chane hagadol. Focile maius, & arundo, & canna ma

ψ 1,2,3 ior, seu domestica cruris. Cæterũ exterius gracilius q; os insignitũ, ac fibula nobis dictũ, appellatur πτέρνη, πτελεκὰνη. Sura. עצם הקטן chane hachatõ. Focile minus, cãna, et arũdo minor cruris.

Φ, Χ 1,2,3 Malleoli, σφυρὰ, ταῖς, latinorũ aũt nõnullis malè tali appellãtur, שתי קנוזות הנלוים משני הקצים scete chezzauoth haboletim misene bachanim. Clauiculæ, cauillæ, cababin. Ac Φ quidẽ interiorem indicat malleolũ, Χ autẽ exteriorẽ. Ω, 1,2,3 Talus, ἀστράγαλος, ἄστριον, Latinis Interpretibus quibusdã parũ rectè malleolus appellatur, fortassis buc quorundã nõ Anatomicorũ sententia ductis, qui τὸν σφύρα malleũ, neutro aũt genere τὰ σφυρὰ talos potius significare cõtendũt. Basilicæ os, cauilla, chabab, alsocht. חפרסל bacharsul, עקום baarechom.

a 2,3 Calx. πτέρνα, λακάνη. Calcis os. עקב baacheu. Alrip, calcar pedis.

b 1,2 Os cymbũ scaphamue referẽs, σκαφοειδὲς. Nauiculare, nauiforme. עצם השוה או כמיוה סנטה עקב bechi hasi. aue, aut sephinachotena. c, c 1,2,3 Hæc pedis pars quatuor efformata ossibus, nobis tarsus, ut & Græcis, ferè nũcupatur. רסג rasegh. Raseta pedis, & ossa rasctæ pedis. Tria autẽ

d, e, f. interiora d, e, f insignita, priuatim σκαφοειδὴ quibusdã appellãtur. extimũ uerò ac q nocatũ, μόσχος mus os cubũ tesseramue referẽs. λυδικὸς, πλινθοειδὲς. Cubiforme, quadratũ. ברוי chardij, עצם נשר bezem nipirat. Grandinosum, nerdi. b, b 1,2,3 πάτυη. planta, planum, uestigium & solum. κατὰ πεζὸν, σόλος. Pectus, & pecten. חטיט חזה mafrech barecghel. Alselauuet.

i, i 1,2,3 Pedis digiti. k 1,2,3 Characlere k ossicula uocãtur sesamina. σησαμοειδὴ עצמות הבלטים bel tbesaminatb. Alsemsemiæ.

LIBRI PRIMI FINIS.

ת & צ, 1, 2, 3:

". . . ת & צ . . . שוק scoch . . ."

The correct transliteration is shok. שוק, means joint, shoulder, leg, foreleg. In this case it means specifically foreleg.

For שוק see Brakoth 24a. Cf. Tabula V, 11.

ϕ 1, 2, 3:

". . . . tibiae os . . . הגדול קנה chane hagadol . . ."

A better transliteration is kaneh hagadol. קנה kaneh means reed, stick, reed-like thing; הגדול hagadol means the large. Thus הגדול קנה means the large reed-like bone, i. e., the tibia. The term is grammatically misused, since the noun like the adjective must also have the definite article. Thus it should be הגדול הקנה hakaneh hagadol or only גדול קנה kaneh gadol, without the definite article, as found in the *Tabulae*.

Cf. Tabula V, 12, 13.

ψ 1, 2, 3:

". . . fibula . . . הקטן קנה chane hachaton . . ."

The correct transliteration is kaneh hakaton, but here too, as was noted above, both words should be given the definite article, ה ha, thus reading הקטן הקנה hakaneh hakaton, or קטן קנה kaneh katon. קנה kaneh means reed, stick, reed-like; קטן katon means small. Thus הקטן הקנה hakaneh hakaton means the small reed (-like bone), i. e., the fibula.

It is rather worthwhile mentioning that the Hebrew equivalents for radius. ulna, tibia and fibula, respectively, as given above, are rather poor. To call the bones of the forearm "pillars" and the bones of the leg "sticks" is rather a logical, and, therefore, a philological error. It seems that it is the bones of the forearm that resemble sticks, while the much larger bones of the foreleg are analogous to pillars upon which the human body stands. Indeed, in modern Hebrew the radius is called סובב sovev, "turning" (bone), the ulna קנה kaneh, "stick (-bone), the tibia קנה גדול kaneh gadol, large "stick," the fibula קנה קטן kaneh katon, small "stick" (as compared with the tibia).

For קנה vs. עמוד cf. above terms under TV with Tabulae IV, 11, 12, 13 and V, 12, 13.

ϕ, χ 1, 2, 3:

". . . Malleoli . . . משני הקנים הבולטים קצוות שתי sete chezzauoth haboletim miscene hachanim . . ."

The proper transliteration is: shthey ktzavoth haboltim mishney hakanim שתי shthey is the feminine gender for two; קצוות ktzavoth is the plural form of קצה katzeh, end, a masculine noun; הבולטים haboltim means that stand out, the root being בלט, stand out; משני mishney means from

the two (masculine form); הקנים hakanim means the sticks, the reeds. Thus שתי קצוות הבולטים משני הקנים means literally "two ends that stand out from the two sticks" (tibia and fibula), i. e., the malleoli. One should note that while קצה katzeh is a masculine noun, yet the number שתי shthey is feminine, which is grammatically wrong, the correct form of the number should accordingly be שני shney, as in the case of הקנים hakanim. Moreover, we are dealing here with a description rather than a term.

For a single term synonym see Tabula V, 14.

Ω, 1, 2, 3:

"Talus . . . הקרסול hacharsul, ערקום haarcchom."

הקרסול hacharsul. The proper transliteration is hakarsol or hakarsul, meaning generally the bend or joint at the ankle, the ankle, here it designates specifically the talus. Better transliterated in Tabula IV, 18. For קרסול see Oholim I, 8.

ערקום haarcchom. The proper transliteration of the term seems to be arkom, although as such it is meaningless in Hebrew. But if we change ערקום arkom into ערקוב arkov or arkuv, which is philologically synonymous with ארכובה arcuvah, then its meaning is curve, the inner angle of the knee, here—the inner angle of the ankle. However, from the way the word is placed in the text it seems to have been used as the synonym of הקרסול, the talus. The transliteration seems to have the definite article ה ha which is missing in the Hebrew equivalent.

a 2, 3:

". . . Calcis os. עקב haacheu . . ."

The correct transliteration is akeyv or eykev and means heel, the bone of the heel, i. e., os calcis. In the transliteration the definite article -ha- is used, which is missing in the Hebrew equivalent.

See Tabula V, 15.

b 1, 2:

". . . Nauiculare, nauiforme. עצם השוה או ספינה קטנה hezem hascaue, aut sephinachotena."

The proper transliteration is etzem hashaveh o sphinah ktanah. עצם etzem means bone; שוה shaveh means equal, fitting; או o means or; ספינה sphinah means boat, vessel; קטנה ktanah is the feminine of קטן katan, small. Thus עצם השוה או ספינה קטנה means literally "the fitting bone" (into the navicular surface of the talus) "or the small vessel," which is the exact equivalent of os naviculare.

For a one-term synonym compare Tabula IV, 19.

c, c, 1, 2, 3:

". . . tarsus . . . רסג rasegh . . ."

For a detailed discussion see above: Z, Z 1, 2, 3 . . . *καρπός* . . .

g:

". . . Cubiforme, quadratum, כרדי chardij, עצם נפרד hezem nipirat . . ."

כרדי chardij. The term as such has no meaning in Hebrew and its transliteration should be kardi. It may be, however, that a misplacement of letters occurred and it would then be not כרדי kardi but כדרי kadri, an adjectival form, being the Hebrew adaptation of quadratus, meaning quadrate, just as haaorti was adapted from the Greek AOPTH. And perhaps more convincing would be the idea that it should be טרדי tardi instead of כרדי kardi, meaning cuboidal, as found in the *Tabulae*. Thus כדרי kadri or טרדי tardi means quadrate, or cuboid, respectively.

For טרדי, but in plural, see Tabula IV, 21.

עצם נפרד hezem nipirat. The correct transliteration is etzem niphrad. עצם etzem means bone; נפרד niphrad means separate, segregated, its root being פרד. Thus עצם נפרד means the single bone (in relation to the three cuneiform bones), and is given as the synonym of the preceding term. Incidentally, the Hebrew equivalent of the cuneiform bones is not given by Vesalius.

h, h, 1, 2, 3:

". . . *μέτεταρσος* . . . מסרק הרגל masrech hareghel . . ."

The proper transliteration is masrek haregel. מסרק masrek means comb; הרגל haregel means the foot. Thus מסרק הרגל means the comb of the foot, referring to the metatarsals, which with the tarsus form a comb-like structure. In the *Tabulae* only מסרק is given.

Cf. above Γ, also Tabula IV, 15, 22.

i, i, 1, 2, 3:

" Pedis digiti . . ."

The Hebrew equivalent is not given here, probably because it was already given above in connection with the upper extremity. In the *Tabulae* the equivalent is also given only once, but with the order of the letters reversed.

See above ΔΔ 1, 2, 3 and Cf. Tabula IV, 16.

k 1, 2, 3:

". . . sesamina . . . חלתסמיניאת helthesaminiath . . ."

The proper transliteration should probably be chelthesaminiath. The term, however, as such is entirely nonsensical in Hebrew, but it is possible that the term is a composite of two words חל chol and תסמיניאת sesaminiath; חל meaning sand, grain of sand, here sand-like, particle-like, and תסמיניאת thesaminiath is its Latin equivalent of sesamoid.

P. 233, marginal note: . .

" Ex Avicenna Hebraeo, קרום המכסה הגולגולת או הקדירה cherum hamechase hagulgholeth, aut hachedera. Panniculus carnosus."

קרום המכסה הגולגולת או הקדירה cherum hamechase hagulgholeth aut hachedera. Proper transliteration: krum hamĕchaseh hagulgoleth o hakĕdeyrah.

Literally קרום krum means membrane, המכסה hamĕchaseh means that covers, הגולגולת hagulgoleth means the skull, או o means or, הקדירה hakĕdeyrah (better spelled הקדרה) means the pot (cranium). The whole term then means: The membrane that covers the skull or the cranium ("the pot"), i.e., the scalp. Obviously no mention has been made here of the "fleshy" characteristic of the scalp implied in the Latin equivalent. Furthermore, here too, as in the case of the malleoli above, one finds an anatomical description rather than a term.

For גולגולת or קדרה see Tabula V, 1, and lines 18-19, paragraph one, p. 166, the Fabrica.

REFERENCES

1. Einhorn, A. I., Haadam, Mada, Warsaw, 1921.
2. Etziony, Mordecai, The Hebrew-Aramaic Element in Vesalius' Tabulae Anatomicae Sex. *Bulletin of the History of Medicine*, 1945, 18: 413-24.
3. Friedenwald, Harry, The Use of the Hebrew Language in Medical Literature. *Bulletin of the Institute of the History of Medicine*, 1934, 2: 77-111.
4. Grazovsky, V. and D. Yelin, Hamilon Haivri, Jaffa, 1919.
5. Hyrtl, Dr. Joseph, Das Arabische and Hebraeische in der Anatomie, Vienna, 1879.
6. Jastrow, Marcus, A Dictionary of the Targumin, the Talmud Babli and Yerushalmi and the Midrashic Literature. Berlin and New York, Verlag "Choreb," 1926.
7. Jewish Encyclopaedia, Vol. VIII, 1925.
8. Perlman, Moshe, Midrash Harfuah, Tel Aviv, "Dvir," 1926.
9. Vesalius, Andreas, De Humani Corporis Fabrica, Basel, 1543, pp. 166-168.
10. Vesalius, Andreas, De Humani Corporis Fabrica, Basel, 1555, pp. 206-208.
11. Vesalius, Andreas, Tabulae Anatomicae Sex. Six Anatomical Tables: 1538. London; priv. pr. for Sir W. Sterling-Maxwell, 1874.

HETERODOXY AND MEDICAL PROGRESS *

CHESTER NORTH FRAZIER

The history of medical progress is the story of man's search for truth; of his struggle against bigotry and obscurantism; and of his will to employ the knowledge thus gained for the common good. New ideas are often repugnant. They disturb established concepts, and violate traditional modes of thought. Not infrequently, in the end, they alter conventional patterns of action. Dogma and out-worn tradition have hindered human progress. This was true of the past; it remains true of the present.

Science and medicine produced their heretics. To be sure, few have died at the flaming stake; nonetheless, they have often felt the sting of abuse, and suffered the neglect and scorn of their contemporaries. To the sensitive, this is like death itself. Others, more obdurate, have reacted at times with much less dignity.

It is not without profit to reflect upon the unorthodox views of our forebears, and to observe the kind of men they were. The past has a way of revealing the present. It may also be of interest to recall a few of the movements originating outside the limits of medicine itself, or at least not too intimately related to its tradition, which have affected in one way or another the development of medical practice.

When thinking of men of genius and the ideas for which they stood, it is well to remember that they were but the issue of the time in which they lived. The ideas they conceived were generally a more or less final expression of current thought which had reached a state of crystallization in a gifted mind, one perhaps more courageous and more original than the rest. As a rule, new ideas do not spring full-sized from the human mind. They grow insidiously, nourished by the vigor of the environment from which they spring. Particularly is this true of the movements extrinsic to medicine itself, which later mold its form. These come from the feelings of the people, from inner yearnings which move them to action for their protection and preservation. Folk-medicine had this origin. It is a continuing process. Man in his groping way seeks ever to achieve a happier and more harmonious life.

Progress being born of the people, it is necessary to know the times in which men live if the true significance of the ideas they expressed are to

* An address to the Graduating Classes in Medicine, Dentistry, and Nursing, University of Tennessee. December 17, 1945.

be fully understood with relation to the environment which engendered them.

In spite of much evidence to the contrary, man has moved forward, not backward. The medicine of today is far different than at the time of the Renaissance and the Reformation, when flourished the first man of whom I wish to speak.

It was a period of violent readjustments. The fetters of authority had been broken. Aroused by the consciousness of their powers, strong and bold men sought new meanings in art and in philosophy, in literature, and in politics and theology. Luther had nailed his theses on the church door at Wittenberg. The strife between Catholic and Protestant was bitter. No mercy was shown the suspected heretic. The printing press had been invented; knowledge and new ideas were becoming the property of the people.

Into this *milieu* Michael Servetus was born. He was a Spaniard, educated in theology, medicine and law. In a book, *The Restitution of Christianity*, written in the Latin tongue, he revealed a clear view of the nature of the lesser, or pulmonary, circulation.

Above all else a theologian, why had Servetus this interest in physiology? It was that he believed physiology to be a path leading to a knowledge of God. If he was to understand the spirit of God, it was necessary that he first know the spirit of man. To know the spirit of man, he must acquire a proper knowledge of the structure and workings of the body in which the spirit dwells.

In defending this thesis, Servetus disagreed with the Protestant theologian, Calvin, as to the interpretation of Biblical phraseology. For this, the " mere juggling of verbiage," Servetus died; burned at the stake along with his books, a martyr for " the crime of honest thought."

In the person of Servetus, the theologian and physician were combined. It was the Church in the Middle Ages that preserved the heritage of medicine. The School of Salerno, where Greek traditions in medicine were revived, was largely of monastic origin. Servetus, then, represented the transition of medicine from religious to secular authority.

Contemporaneous with Servetus, lived one of the most vigorous personalities in medicine. Today, he would have been called a quack. This man was Philip Theophrastus Bombast von Hohenheim, who later called himself Paracelsus. He was born in Switzerland the year following the discovery of America. Today, December 17th, is the four hundred and fifty-second anniversary of his birth. It is said of him that he was one of the few men who ever advanced medicine by quarreling about it.

He was the precursor of a new era of chemical activity in relation to medicine, and perhaps the most original thinker of the 16th century. At least, he was most forceful and belligerent. Of more earthy stuff than the gentle Servetus, he spoke and wrote in the language of the common people. The sophisticated Latin of the scholar was not for him.

Paracelsus was no respecter of medical tradition; age meant nothing to him. " Not by their age, but by their fruits " shall a medical system be judged. Each age, he thought, possessed its own potentialities, making it the duty of a man to work within his own age that its destiny might be achieved and fulfilled.

The spirit of provincialism did not possess him. Paracelsus longed to know what others in the world were doing. Thus he became a wanderer. In his vagabond journeys he traveled far and wide over Europe, fraternizing with all kinds of ordinary folk; with barbers and executioners, with bath-keepers and gypsies, with midwives and fortune tellers. From these he acquired an unusual knowledge of the medicine of the people in the countries over which he traveled, and, according to some, a permanent taste for low company.

Hear him in his defense against ridicule at being a wayfarer. " The journeys have profited me much, for the reason that no man's master is in his home and none has his teacher in the chimney corner. Thus the arts are not all confined within one's fatherland, but they are distributed over the whole world. . . . they must be gathered together, sought out and captured, where they are."

Far in advance of his time, he discarded Galenism and the four humors, and taught the use of chemical agents.

To Paracelsus, " false physicians " were objects of contempt. He scorned their motives. Said he, " If there were a man sick of a fever due to end in twelve weeks, and then it would be over and done with, and if it happened that the sick man demanded medicine to drive out this fever before its appointed end, he would have two kinds of physicians before him, the false and the true. The false proceeds as follows: he begins gradually and slowly to doctor him, spends much time on syrups, on laxatives, on purgatives and oatmeal mushes, on barley, on pumpkins, on melons, on julep and other such rubbish, is slow and frequently administers enemas, does not know himself what he is doing, and thus drags along with time and gentle words till he comes to the term. Then he ascribes the spontaneous end to art." Certain practices, it seems, are ageless.

Paracelsus felt required to defend himself against his rejection of

"false physicians" and their exploitation of the people. Hear him again: "Let no one be astonished that I cannot praise gain in medicine. The arts are by profit falsified, and the falseness causes corruption in all things—therefore, should the physician not grow from profit but from love."

In bitterness against fraud, he continued: "I for my part am ashamed of medicine, seeing to what utter deceit it has come. Indeed, there is not a desperate henchman, brothel-keeper or dog killer but wants to sell his human, or dog, dripping for gold and heal all diseases with it. Thus do come all the lazy and profligate rascals into medicine and sell their medicine, whether it makes sense or not. Now he who can fill sacks with gold, he is praised, he is a good physician. . . . Although the art itself is a great treasure of nature, it is not given any consideration by such incapable persons. They are thieves and murderers, they enter not by the right door. It is a grave and pitiful thing, that such art should be full of such incapable, careless persons and be thus rendered false. . . . their knaving is so utterly manifest, that none of us is of good report but all of us are thought alike."

All that he said fell on deaf ears; the fearless shouting had no audience. Few of the things he wrote were published during his lifetime. The medical faculties conspired against him. The people refused to listen. In his frustration, he was moved to bitterness. His rough manners repelled those who might have been faithful to him. With no followers, he failed to reform the medicine of his day.

After a tumultuous and futile life he died in poverty, some say by violence, in a little inn called the White Horse. A militant iconoclast, rough perhaps, and raucous, yet in a spirit of humility before God and nature, he challenged the effete world of authority and proclaimed a new philosophy, which in essence foreshadowed the method of modern science: *experientia est scientia.*

Time has passed; it is the 17th century. The world has changed; great discoveries have marked the intervening years since Paracelsus thundered his unheard vituperations against the indifference of his time. Vesalius has discarded the authority of Galen and created a new anatomy based on the dissection of the human body. Men now look forward rather than backward. The era of science has dawned. Harvey has described the circulation of the blood. The microscope has been invented, and through its still feeble light a new world has been revealed. Malpighi and Leeuwenhoek have supplied the final proof of a continuous vascular system.

Freed of the confining influence of medieval scholasticism and the

intolerance of ecclesiastical dogma, man has returned to the simple methods of observation and experience; methods inaugurated by the ancient Greeks. Hippocrates is again enshrined in the person of Sydenham. It was he who advised the reading of Hippocrates, Cicero, Bacon and Cervantes as the student's foundation in medicine. Discarding old theories as of little value at the bedside, he relied upon his powers of observation. Disease to him was a developing process, running a regular course, with a natural history of its own.

Toward his contemporaries, Sydenham was indifferent and scornful. By them he was neglected and opposed. Relying upon himself and a direct approach to the understanding of disease, he fathered modern clinical medicine. In his wake there followed the great Boerhaave of Leyden, who popularized the teaching of medicine at the bedside, a practice which continues to this day.

The brutalities of earlier times had largely disappeared by the close of the 18th century. Disease was no longer the manifestation of divine wrath; a rational attitude toward its causes had slowly replaced the ignorant superstitions of the past. Yet, in spite of this, the insane continued to be mistreated. They were still possessed of devils. Shackled like common criminals, often bullied and beaten into submission, they lived in squalid neglect. The Lunatics Tower was a show-place in Vienna, and there, as formerly at Bedlam in England, the insane were exhibited to the curious public like animals in a zoo.

Paris was still in the turmoil of revolution, when there appeared one of the most noble figures of medicine, Philippe Pinel. No great scientific discovery makes his name memorable. To him, as to the forgotten Paracelsus, insanity meant disease.

When Pinel appealed to the President of the Commune and asked authority to unshackle the insane, he was met with suspicion. In the request was seen a plot to aid the Aristocrats; Pinel, himself an Aristocrat, might be concealing enemies of the People among his mad-men. When Couthon visited the madhouse to which Pinel directed him, he was shocked and horrified by what he saw and heard. The shrieks and blasphemies of those who were chained to the walls had been his greeting.

"Ah citizen, art thou thyself a madman, that thou desirest to turn such cattle loose? . . . Thou wilt become thyself a victim of thy preconceived opinions." But the chains were removed. Wholesome food and sunshine were brought to the dismal and unsanitary cells. However, Lunatics Tower in Vienna was not closed until 1853, so very slowly do we move.

Boyle had laid the foundations of modern chemistry, later to be advanced by Priestley and Lavoisier, who fell victim to the Terror. The intuitive fumblings of Paracelsus were living reality.

In Padua, Morgagni had studied the anatomy of disease, which Auenbrugger with percussion and Laennec with auscultation later brought to the touch and ear of the physician at the bedside.

Jenner had prevented smallpox. The scene was being set for the next great epoch in medical history. Contagion had long been suspected, but it was not the vapors of the swamp by which it would be explained.

Almost as a prelude to the discoveries of Pasteur and Koch, who found that disease could be caused by minute life entering the body, a young Hungarian, Semmelweis by name, robbed child-birth of its greatest terror. In the lying-in hospitals of the time, women died with appalling frequency of a fever after they had borne their children. Oliver Wendell Holmes had seen in such deaths contagion carried by the physician. He urged cleanliness and the washing of hands as measures of prevention. By this advice he stirred up violent opposition from the obstetricians of Philadelphia. They could not be accused of the responsibility for these deaths.

That they were responsible, Semmelweis was to show by irrefutable logic. Child-bed fever was a blood poison carried to the parturient on the hands of the physician. Driven from Vienna by the persecution of his fellows, he returned to Budapest, his birthplace, where in 1861, he published the immortal treatise on *The Cause, Concept, and Prophylaxis of Puerperal Fever*, to die a few years later brooding over the insults of those who had opposed him.

Thus the great central stream of medicine has flowed to the present, enriched by the fertile tributaries of its most gifted minds. But there were also lesser sources which in their flood had fed the course of the mighty river, unseen perhaps by those who watched the slow progress of the moving current.

There was the quack and the charlatan, and the visionary utopian, with not a few who felt the touch of faith. Others, there were, with strange systems of disease and with the drugs and gadgets of treatment. Often, like fast-moving comets they passed and were forgotten. Others, however, more tenacious, fastened themselves on the credulity of the people with such stubbornness as to have affected the content of medicine, or modified its purposes. These are the extrinsic influences, distinct from those which have originated within the body of medicine or its related disciplines.

If it was the unorthodox adherents of medicine, who wrought progress

from within, it was the heterodoxy of the people which affected medicine from without.

Was not the barber once the surgeon of the people? He let their blood, cupped their pains, and pulled their teeth. While the physician, "red-heeled and long-robbed, big-wigged and pompous" dared not soil his hands.

It was a rustic barber's apprentice who, in the 16th century, became the most famous and respected surgeon of his day. Like Paracelsus, he was not content to sit in his chimney corner, but forsook the provinces for Paris, where he worked as a dresser at the Hôtel-Dieu. At the age of 27, Ambroise Paré—this was the dresser's name—accompanied the French armies to the field of battle. There by common sense, tempered with a knowledge of Vesalius, he revolutionized surgery, and became an immortal of medicine. He eschewed boiling oil as a cautery for the amputation stump; learned to apply the ligature; and, although germs were unknown to him, cleaned and dressed the wounds of battle in a simple, almost modern way, and "let God heal them."

In the early 18th century, a school of medicine, called homeopathy, arose in Germany. Hahnemann, its founder, revived the old doctrine of signatures, meaning that diseases or their symptoms are curable by those drugs which produce an effect on the body similar to the effects of the disease. More important, however, he believed that the effect of drugs is enhanced by giving them in minutely divided doses. This theory, absurd as it is, must have left its influence on medical practice. It was the era in medicine when people were exsanguinated by bleeding, dehydrated by purgation, salivated by quicksilver, and in other ways tormented by the excesses of good intention. No doubt the extreme popularity of the homeopathic doses was evidence not so much of the efficacy of the diluted tinctures as it was of the relief from over-dosing. It is not hard to believe that Hahnemann's innovation proved a salutary lesson to medicine. Even though Hahnemann died a millionaire, perhaps the price was not in excess of the value.

The workings of the human mind have ever been man's greatest mystery. Throughout all time, the organ of the intellect and the emotions has baffled understanding. With the conventional tools of science, the body has yielded many of its secrets. Yet the microscope failed to reveal the subtle facts of personality. Like the ancients, we of the present had set our eyes upon a far horizon; where they awaited a Leeuwenhoek with his lenses to bring the meaning of somatic disease, we, in similar expectation, awaited a key to the meaning of the psyche, and of our being.

How is it that we live with ourselves; wherein do we fail to live with others; what is the meaning of life itself. These were among the questions that were asked.

Consciously or unconsciously,—often in frustration—a procession of seekers have thought they saw the answer to these questions. They were queer people, by and large, who felt instinctively the need to satisfy some inner craving. Yet, Paracelsus too appeared eccentric, as even had Jenner and Laennec in their time and in their place. For had not the well-disposed gone to Jenner and " in kindness " begged him not to reveal the discovery of vaccination to the Royal Society; and was not the stethoscope of Laennec called by his fellows " useless wood? "

Once, possessed of demons, the insane were exorcised or chained in dungeons until Pinel gave them release. But what of those with less grave troubles of the spirit, the anxious and the neurotic? They sought the healing hand of faith, or the magic of strange places. The healer, whatever his measure of cure, has never lacked of followers, often to the chagrin of medicine.

There was Graham of English quackery with his " celestial bed " which offered conception to the childless; and Greatrakes who practiced the royal touch when Cromwell refused the kingly gift. The cures did not persist, though Robert Boyle of gas-law fame joined in the praises of their virtue. Barnes in Kentucky annointed with oil, and there was Joseph Smith of the Mormons. Both healed through faith. Best known was Phineas Quimby of stern New England, the progenitor of Mary Baker Eddy. In *Science and Health*, she established the most potent movement of them all, which, by the force of its influence and the benefits it conferred upon those whose spirit suffered, shook medicine itself.

Bone-setters and joint-adjusters have often flourished, and with osteopathy and chiropractic, have added physical manipulation to reinforce suggestion, or as remedial measures in themselves. Medicine yielded some to each.

In this jumble of truth and falsehood, a clearer current is discernable, which, though lost at its source in the supernatural, emerges finally in reality.

Paracelsus had once pondered the heavenly bodies and their influence upon human conduct, and used magnets in the treatment of disease. Then came the bizarre Mesmer with his animal magnetism and spectacular seances. Man himself had found at last a way to dominate by suggestion the behavior of man. Freed of its magnetic gadgets and buffoonery, Mes-

merism in the hands of Braid became the phenomenon of hypnotism. Charlatanism was merging into science.

The hypnotists did not comprehend what it was they treated by suggestion; the origin and nature of the maladies they could not understand. Some they called " hysterics." Now hysteria, coming from the Greek word for womb, was known to Hippocrates. The condition was attributed to disturbances of the womb, which " when it remains sterile, is indignant, wandering about the body, obstructing the air passages, throwing the body into extreme dangers, and causing diverse maladies."

Time had moved almost to the present; it was the middle of the 19th century. Charcot had returned to the Salpêtrière in Paris, where hysteria became the object of his study. He knew as well as any man the anatomy of the nervous system and its relation to disease. But his " little hammer " and the tapping of the tendons could not resolve the confusion which followed in the wake of animal magnetism. The effects of hypnotism he could not deny; it relieved certain symptoms, yet the essential cause of the behavior of his patients remained untouched and undefined. One fact had been established; mind was not a negligible quantity.

Into this confusion, came Sigmund Freud, pupil of Charcot, who saw with clearer vision than his master. Unorthodox in the make-up of his thinking, he conceived the idea that hysteria had a meaning in the emotional life of his neurotic patients. These he wished to help, but the tools of psychiatric medicine were limited. There were only two; electrotherapy and hypnosis. They would not suffice. So he too became a seeker for a tool with which to reveal the mind, as Leeuwenhoek two centuries before had sought a way whereby to reveal the hidden fabric of the body. This, Freud found in psychoanalysis. Imperfect tool, no doubt, as was the first crude lens with which his predecessor saw afresh the hidden secret of the blood. Yet, withal a tool, for those who would but use it.

Freud thought he saw that man forgets, and willfully loses in his memory, those distasteful experiences that shock his calm, disturb his harmony, or shame his conscience most. This he does from birth to death. Lost in the unconscious chambers of his mind, these forgotten ghosts reside, there to torment his thoughts, sway his emotions, and disturb the behavior of his conscious mind. This was the foundation stone for an understanding of the neurotic personality. It was for the release of these forgotten memories of the unwanted past to the awareness and control of the conscious self that Freud fashioned this tool of exploration.

Paracelsus in his time, when mental diseases were the concern of the-

ology and belonged to demonology, wrote these prophetic words in the preface of his treatise on *The Diseases that Deprive Man of His Reason*: "In nature there are not only the diseases which afflict the body and our health, but many others which deprive us of sound reason, and these are the most serious. While speaking about the natural diseases and observing to what extent and how seriously they afflict various parts of the body, we must not forget to explain the origin of the diseases which deprive man of reason, as we know from experience that they develop out of man's disposition."

The influence on medicine of the Freudian concept has been the integration of mind with body. It has become apparent that the psyche and the soma, the mind and the body, are closely related aspects of the living organism. It can no longer be denied that the mind can, and does, engender physical disease. Socrates in his wisdom once saw this fact: "Just as you ought not to attempt to cure eyes without head or head without body, so you should not treat body without soul."

For centuries, the central theme of medicine has been the individual and his relation to disease. But man does not live alone. Surrounding him on every hand is a multitude of forces—largely unrecognized—which affect both his mind and body. If man cannot fulfill harmoniously his social obligations, his mind sickens and his body accordingly suffers. If the physical fabric of his environment is unwholesome, he becomes sick in body and his spirit weakens. As an individual, the hazards of health are largely beyond his control. He is unable to assure himself that his neighbor does not harbor contagion, and if he could so assure himself, there would be little he could do about it. Nor can he know what hazards of health lie in his occupation, or are hidden in the food he eats.

Although Jenner, as long ago as 1798, found smallpox preventable, there is as yet no universal acceptance of the responsibility by the individual for the prevention of this disease.

Prevention of disease, therefore, was made a matter of corporate concern, and so became a function of the democratic system, where the people act in concert for the general good.

More and more the noxious influences of environment become the concern of popular authority. This has been a development chiefly of the 20th century.

At the beginning of the Industrial Revolution, now over a century ago, certain good citizens of Manchester, England, joined themselves together in what was probably the first board of health. Especially were they inter-

ested in the deplorable sanitary conditions existing within the spinning mills of the city, and in the neglected health of the miserable and malnourished workers transported from the freshness of the country-side. One of the members of the board, a mill-owner by the name of Robert Owen, was to become the father of industrial hygiene, the result of his achievements in improving the working conditions in the factories.

Owen was the son of a Welsh iron-monger and possessed an unusual sense of social responsibility as well as a talent for making money. He introduced sanitation into the spinning mills which he acquired at New Lanark in Scotland, and improved the health of his workers by the adoption of proper hygienic measures, including adequate housing, wholesome food, and suitable clothing. He also established nursery schools for the children of labor, and brought teachers from the Pestalozzian school of natural education in Switzerland. New Lanark, transformed, became the mecca of the cultivated world.

As an industrialist, Owen's unorthodoxy brought him great wealth; as a humanitarian, new ideas of social reform. Owen thought he saw a way whereby not only to preserve the health of the people but to restore health to the sick as well.

Deep in the Indiana wilderness at New Harmony, he established in the year 1825 his first community of equality in what was to be a *New Moral World*, which would "give happiness to every human being through all succeeding generations." The wilderness, however, was not congenial to the new order, and the community quarreled and disintegrated. Now only the ideas of Owen survive, together with a friendly village on the rolling banks of the Wabash River, where people still dream of utopia that perished.

Time has brought new problems, but those left unsolved by Robert Owen still remain to plague us.

Knowledge of disease, we have, and increasingly more. Notwithstanding, the distribution of the fruits of knowledge has but only commenced. People become more conscious of the needs of life and of healthful living. Where once faith healers gave mental solace, now Painless Parkers service teeth in the manner Woolworth, and doctors *déclassé*, under neon lights, offer health at bargain prices. Medical problems again await solution. Now an economic tool is sought.

"New times require a new medicine." This is what Paracelsus said.

DR. ALFRED SPALDING
1815-1878

GLIMPSES OF A DOCTOR'S LIFE IN KENTUCKY
1815–1878

REBECCA W. SPALDING

"Don't come back tonight!" These words were spoken by my mother to my father on a dark, stormy, winter afternoon as he was starting to see a patient out in the hills back of our river town. He was going on horseback, as that was the only way one could travel over the bad roads in winter time. His reply was: "I must come back tonight."

I was only a very young child then, but I can never forget how sad and silent everyone was at the breakfast table the next morning, and particularly do I remember the anxious look in my mother's eyes. My father had not come back!

Late in the morning he rode home, and we learned that most of the night had been spent at the entrance of a coal mine. His horse had lost the road in the darkness. I lingered near while he sat with his boots in a tub of water till they were thawed out sufficiently for Leonard Lee, our stout colored man, to pull them off.

Someone has written that "every little town on the Ohio River has a Front Street." Ours certainly had one, and our house stood directly upon it, as did all of the oldest houses in the little town of Greenupsburg, as it was first called, in Kentucky.

A winter scene comes vividly to my mind. The River had been frozen over, but now it was a rushing flood of mushy ice. My mother and I stood by the window in her room. The ferry could not run—no boats were running—but my father was crossing it in a skiff rowed by the ferry man. We watched till the skiff was only a black speck near the Ohio shore, far down by the bend three miles away. Afterwards we learned that the swift current and the ice had exhausted the oarsman, and he was lying in the bottom of the skiff while my father, by his own utmost exertions, had reached the other side of the river.

No matter what the weather was, how rough the roads, or how deep the mud, my father travelled many, many miles to his patients up and down the river in Ohio and Kentucky and back from the river out in the hills. On bright summer days, if the distance was not too great, we children were sometimes allowed to go with him. I was delighted when my turn came, though a little anxious while crossing the river. Sometimes a long,

high wagon, loaded with charcoal and drawn by three yokes of oxen, was crowded onto the ferry. The wagon, the oxen, the horse and buggy had to be fitted in just right. There was no room to spare.

Mr. O. B. Gould and my father were friends. Two men more unlike in appearance you never saw. Mr. Gould was tall and dark, looking something like Lincoln, while my father was fair and of medium height, but there was no difference in their politics and their love of horses. They had the finest horses in all the country around. Mr. Gould lived at Franklin Furnace, five miles down the Ohio River. Every Sunday afternoon when not called elsewhere my father drove down to see his friend.

Once Mr. Gould had an acute illness. His condition was such that my father himself sat up all night with him. In the wee small hours his anxious wife stole to his room. She did not enter it; but paused at the door. Then she went back to bed perfectly satisfied that the crisis was passed and her husband was on the road to recovery. Why? She had heard the two men talking of horses!

It was pleasant travelling in summer time behind his fast trotting horses, but in winter it was impossible to drive over the rough, muddy roads. The only way to go was on horseback.

I have just read a letter dated 1866, written by his brother, Dr. Edward Spalding, of Nashua, New Hampshire. It was written to his wife, telling of his safe arrival in Kentucky. He wrote: "Alfred came home early in the evening covered with mud and wet with rain, which he and all the family took as a matter of course."

On rare occasions when I was a small child, I was allowed to sit up till nine o'clock with my father in his office. How fascinating it was to watch him roll out pills on the little "pill machine," with bright metal grooves in it! The flat roller had grooves in it too. After the pills were made, I loved to be held in my father's lap before the bright cannel coal fire. The "pill machine" had come from Cincinnati, the city to which my father went twice a year to renew his stock of drugs. On these occasions he also bought wonderful groceries at Peebles and books at Robert Clark's. In those days the trip to Cincinnati was made by boat. When the river was at a good stage, one of the big sidewheelers of the White Collar Line reached our town about five o'clock in the afternoon and arrived in Cincinnati early the next morning, so the day could be spent in shopping before the boat left at five o'clock in the afternoon.

Only twice can I remember that I was reproved by my father, and I can never forget the feeling of guilt and shame when one of his patients suf-

fered because I forgot to deliver a message. It was summer time, both front and back hall doors were open. I was playing in the yard when a man came through the hall and spoke to me. He had not found the doctor in his office, and nobody was in sight except my small self. I still remember how he stressed the importance of the message I was to deliver about someone who was ill in his household. He had come from " over in Ohio." It was not till several days afterwards that my father told me of the forgotten message, and made me see, oh so clearly, how much I was to blame. Meantime he had been to see the patient.

Though I was very young when he died, I was not too young to have some appreciation of the grave, silent man who was my father, of his wisdom, skill and endurance.

My eldest brother, Dr. George Spalding of New York, told of having seen my father perform with success a difficult and dangerous operation in the home of a poor patient by the light of a kerosene lamp, which George had held for him. A New York medical journal reported such an operation as almost an epoch-making performance by a noted New York surgeon, with all of the appliances of modern science at his command. Of course there were no trained nurses in those days, and no hospitals were near in that region of country where we lived.

So vividly do I see those old days as memory calls them up that it is also difficult to realize that they belong to the far distant past. My father died on December 20, 1878, after having practised his profession with untiring zeal and devotion for thirty-four years. He was born on October 24, 1815 in Amherst, New Hempshire, the son of Dr. Mathias Spalding, who attended post graduate lectures in London and brought vaccine from Dr. Jenner in London to Dr. Waterhouse of Boston in a silver snuff box. He graduated as an M. D. at Dartmouth College in 1843, after having spent a year at the Medical College in Cincinnati, Dr. Reuben Dimond Mussey, from Amherst, was a professor there, and I think that must have been the reason why he chose to do this.

I have before me now a box of precious old letters. A card has just fallen from among them. It reads as follows:

DARTMOUTH COLLEGE
LECTURES ON
ANATOMY AND PHYSIOLOGY
ADMIT MR. ALFRED SPALDING
OLIVER W. HOLMES—PROFESSOR
AUGUST 8, 1839.

Now I shall quote from a letter written from Cincinnati:

CINCINNATI—March 2, 1842

My Dear Uncle:

A longer time than I would willingly have allowed has passed without my writing to you, but you have often been in my thoughts. Our lectures have closed and with them some of my duties, and although I shall continue to be pretty constantly occupied, I shall have more control of my time than I have had during the winter. Prof. Kirtland, whose name you may have met with, connected with the subject of natural history, has resigned his chair in this school and accepted a professorship in the Willoughby Institution. He is said to possess one of the finest private collections of birds and insects in the country, but I have not seen it as it is at Cleveland, the place of his residence, except during the lecture term. Dr. Locke, the Professor of Chemistry, is *the great man of the West*. You probably know something of him by reputation. He is a native of Connecticut, and as a chemist, minerologist and geologist, he ranks among the very first men in our country, and is also a great botanist. He has been over most of the Eastern states pursuing these studies, but it is to the fossil remains and geological history of the Western States and down the Valley of the Mississippi that he has particularly devoted himself. We have had a few lectures from him on these subjects. They were exceedingly interesting. He is a very ingenious, practical man—makes many of the instruments which he uses for his experiments, and has also invented an electrometer, which is the most perfect instrument of the kind. It is so delicate as to indicate the electricity excited by ones taking his hat off at 4 or 5 feet distance.

Dr. Mussey continues to live as he did in the East, though he allows some of his patients to eat lean meat once a day. He eats nothing but bread made of unbolted wheat, occasionally water crackers, fruits, and simple preserves. The only condiment he makes use of is salt, and he only drinks water, unless it be that once in three or four weeks he takes a gill of milk with it. It is now nine years since he commenced living in this way, and he says his hand is steadier in operations than it was at that time. He is sixty-seven years of age—is very active, and has been able to go through a great deal of hard service this winter. He has one son in his ninth year, who has always lived in this way, and has never tasted of animal food. He is a healthy, rosy-cheeked boy, with an active mind, and more strength than you usually find in boys of that age. During the winter we have had ten or twelve lectures from the doctor in support of his views, and it is really wonderful to learn how many facts he has collected upon this subject. There is scarcely a known people on the face of the globe with whose habits, modes of living, strength, length of life with which he has not obtained some information, and also with the habits, food and structures of the different classes of animals. It is to be hoped that he will publish a work on this subject, for though some of his views might be considered rather extravagant, yet it would contain a vast amount of interesting matter. You will perhaps begin to think I am already a convert, but I have not yet got quite so far, though I think, the anatomical argument alone considered, man is to be classed not with the flesh eating, nor with the grass and grain eating, but with the fruit and grain eating animals. Dr. Mussey has a large practice in the city, and his fame as a surgeon is spread far and wide. He has patients from as

far south as Mississippi, and occasionally one from Virginia. I am now paying particular attention to the diseases of the heart and lungs, under the instruction of Dr. Worcester, Dr. Mussey's partner, who visited the schools of London and Dublin, and spent most of the last year in the schools of Paris. He is a fine man and bids fair to take a high stand in the profession. The currency is in a sad condition here just now. The banks are to resume t. p. day after tomorrow, and what they will come to no one can tell. Dr. Mussey is willing to supply me with money when I wish for it, and I have consequently thought it would not be worth while to have it sent to me but once. If you can send the remainder of the sum proposed some time in July, I shall feel very much obliged. The best way of sending it is to get a certificate of deposit from one of the Boston banks, and send it directed to me, care of R. D. Mussey, M. D.

I see a good many surgical operations, and hope and believe I am acquiring valuable information, and from the confidence Drs. Mussey and Worcester place in me in professional matters and their kindness to me aside from them, I have reason to feel they are interested in me, but Dr. Mussey will write to father soon and can speak for himself.

Allow me, my dear uncle, in conclusion, to express to you my gratitude for the kindness you have showed me, for I am ever mindful it is to you mainly that I am indebted for the advantages which I now enjoy. God grant that some day I may be able to make a return for it, and if I have my health by industry and perseverance, I shall hope to do so. It will always be a pleasure for me to hear from you, and hoping this letter will find you in good health, I subscribe myself,

Your affectionate nephew,

A. SPALDING

Now I quote from the *History of Amherst*. It says of Dr. Alfred Spalding: "He had a natural aptitude for his profession, in which he greatly resembled his father, with the genial, quiet manners of the courteous gentleman, he united the discriminating and cautious judgment of a superior mind. In his practice, his industry and painstaking fidelity soon won the confidence of all classes. During the Civil War his home was a hospital for the wounded soldiers, and his services were sought by those who did not sympathize with his loyalty to the old flag. His enthusiasm in the study of medicine never abated. The latest reports and the most improved surgical instruments and apparatus—everything possessing any advantage to his profession—was examined, even though it deprived him of rest and sleep. His interest in all local enterprises and improvements was constant. He made many and fast friends."

After his graduation from Dartmouth, my father settled in Greenupsburg, as it was then called, a small Kentucky town on the Ohio River. Another Amherst man lived there, Mr. Sam Seaton. This man had a daughter, Rebecca. My father "formed an attachment to her" and they

became engaged, and this is an extract from a letter written to her on November 2, 1843, when she was attending Bishop Smith's School at Klorama, near Louisville. Evidently Rebecca had been home on a vacation, for he wrote:

During the last week you were here my anxiety for the sick and want of sleep had so exhausted me that I could hardly think or speak when I was with you, and it was your presence alone that kept me awake.

Rebecca's mother wrote:

Doctor went to Tygart after night. He had slept none the night before. He came home today about ten o'clock, had eaten no breakfast, but said he was well. How much I hope, my Rebecca, that you will be everything to him. A physician needs a good affectionate wife. I am sure you will be all that a fond mother could wish. The doctor came upstairs to read "The Neighbors" to me. How good he is. Often I say to myself how good he is. He rides with me, talks with me—in short he is everything a young gentleman should be to an old lady. [She was forty-four.]

On December 31, 1845, his sister in New Hampshire wrote to him: "I am very glad you are so much interested in your profession, as without this a physician will not be likely to make the improvement in his science and skill which he ought, although I must confess myself a little impatient sometimes with your letters being filled up with details of cases."

To his sister on January 13, 1847, he wrote:

The winter has been pretty warm until the last two weeks. The mud and water are now frozen, but it is most intolerably rough, and I believe it worries my horse more to go ten miles than it did to go thirty in the summer when it was good travelling. I have been wishing to go to Cincinnati for the last six weeks, but was not able to get away till last week, and then I came near losing one of my patients. I was there nearly two days at that time. The river was so high that the lower stories of the buildings on the First Street were filled nearly half full with water. Dr. Mussey seems quite well, and gave me a pleasant account of his travels while in Europe.

On November 30, 1863, Dr. Spalding was appointed "Surgeon of the Board of Enrollment of the 9th Congressional District of the State of Kentucky, and was ordered to report to Captain W. C. Grier, Provost Marshall of the District at Greenupsburg, Kentucky." (Signed by Edward M. Stanton, Secretary of War.) He was "Honorably discharged from the Service of The United States, to take place June 15, 1865."

All through the war he rode or drove to his patients day and night with his saddle bags of medicines, but no weapon of any kind, and he was never molested. Kentucky was the state in which brother fought against brother.

The last old letter is dated 1867. In it there is no mention of patients, but much news of horses, for it was written to George, his eldest son, who was away at college. In the letter he promised his son that a colt would be broken and ready for him to ride when he came home on his vacation.

Now in January I think of my father's long, cold rides over frozen roads "intolerably rough" or "deep in mud." In the summer when I think of my old Kentucky home, I see my father's fast trotting sorrels hitched under the buckeye tree at the edge of the pavement, waiting for the last patient to leave the office to take him on his daily rounds, either on our side of the river or across it out to Ohio Furnace, or up to Hanging Rock or to Ironton.

ILLUSTRATIONS PERTAINING TO THE MEDICAL LIFE OF DOCTOR JOHN COCHRAN

THORNTON CHARD

New York History in its July, 1944 issue, published an account of Doctor John Cochran, edited by me under the title "Excerpts from the Private Journal of Doctor John Cochran," in which an account of his medical activities were reviewed and many letters from his hitherto unpublished Journal were given. The illustrations and legends herewith presented supplement the above mentioned account.

Doctor Cochran was a colorful figure in the history of Colonial and Revolutionary medicine who eventually became Director of Military Hospitals during the Revolution. He was born September 1, 1730, at Sadsbury, Pennsylvania, of Scotch-Irish stock. He got his medical training in "physic and surgery" under Doctor Thompson of Lancaster, Pennsylvania.

During the French and Indian War (1754-63) Cochran was with the British Army as surgeon's mate in the hospital department and accompanied Bradstreet when in 1758 he attacked Fort Frontenac. In this campaign, Cochran's meeting with Major Philip Schuyler led him to settle in Albany, N. Y., where he courted and married (December 4, 1760) Mrs. Gertrude Schuyler, widow of Peter Schuyler and only sister of Philip Schuyler. Shortly thereafter he settled in New Brunswick, N. J., where he practised medicine and eventually became one of the founders of The New Jersey Medical Society and finally (1769) its president.

When the Revolution started, Cochran volunteered his services in the hospital department and, in collaboration with Doctor William Shippen, prepared a far reaching plan for establishing military hospitals. This plan, the first to be introduced in the United States, was submitted to the Congress February 14, 1777, and was eventually put into operation. From Cochran's Journal, we learn that twenty nine hospitals of various kinds were finally established.

Cochran's good work must have been observed by General Washington, for the latter recommended him to the Congress as "highly deserving of notice not only on account of his abilities but for the very great assistance which he has afforded—merely in the nature of a volunteer." This recom-

Fig. 1.

Miniature portrait (original in color) of Doctor John Cochran (1730-1807), now in the possession of his g. g. grandchildren.
Photographed from the original.

mendation caused his appointment by the Congress April 10, 1777, as Physician and Surgeon in the Middle Department from which position he was promoted to be Chief Physician and Surgeon of the entire army. Finally, the Congress, on January 17, 1781, gave him the commission of Director General of the Military Hospitals of the United States. This post he held to the end of the war.

When the war ended, Doctor Cochran moved to New York City where he again took up the private practice of medicine. It was while in this practice that, at the suggestion of Washington, he was appointed a Commissioner of Loans for the State of New York. A stroke of paralysis compelled him to relinquish this office and to move to lands assigned to him by the government, as an officer in the Revolutionary Army, near Palatine, N. Y., where he died April 6, 1807.

WASHINGTON'S LETTER TO JAMES DUANE ENDORSING DOCTORS COCHRAN AND CRAIK.

Head Q^{rs} Sep.^{r} 9th 1780

Dear Sir.

I have heard that a new arrangement is about to take place in the Medical Department and that it is likely, it will be a good deal curtailed with respect to its present appointments.—Who will be the persons generally employed I am not informed nor do I wish to know—however I will mention to you that I think Doctors Cochran and Craik from their services—abilities and experience—and their close attention, have the strictest claim to their country's notice, and to be among the first officers in the establishment.

There are many other deserving characters in the Medical line of the Army, but the reasons for my mentioning the above Gent^{n} are that I have the highest opinion of them—and have it hinted to me that the new arrangement might possibly be influenced by a spirit of party out of Doors, which would not operate in their favor.—I will add no more than that I am with the most perfect regd.

D. Sir

Y^{r} Most Obed^{t} Serv^{t}

G^{o}: Washington

The above written on letter paper 13¼″ x 16″ which when folded bears on the same sheet the following: The Hon^{ble} James Duane Esq^{e}.

of Congress—at Philadelp^{a}.

History of the Duane letter: "Joseph Smith Cochran Sr. of Brookwood, Virginia, has the letter. It was given to him by a friend in that county ? [probably Stafford Co.], a Mr. Craig, who had received it as a wedding present from a friend in Missouri." (Ida Cochran Haughton: *Chronicles of the Cochrans.* Columbus, Ohio, 1925. Vol. II, pp. 80 and 129.) The letter at some time came into the possession of Gen. John Cochran, grandson of Dr. Cochran, and was passed on to Cornelia Barclay Barclay, niece of Gen. Cochran, and is now in the possession of her children, the g. g. grandchildren of Dr. Cochran.

Photographed from the original autograph letter.

A similar but longer letter from Washington to John Mathews, in Congress, dated Headq. 9 Sept. 1780, appears in Sparks, Vol. 7, p. 192.

An identical letter from Washington to Joseph Jones, dated Headqtrs. Sept. 9, 1780, appears in Fitzpatrick, Vol. 20, p. 18.

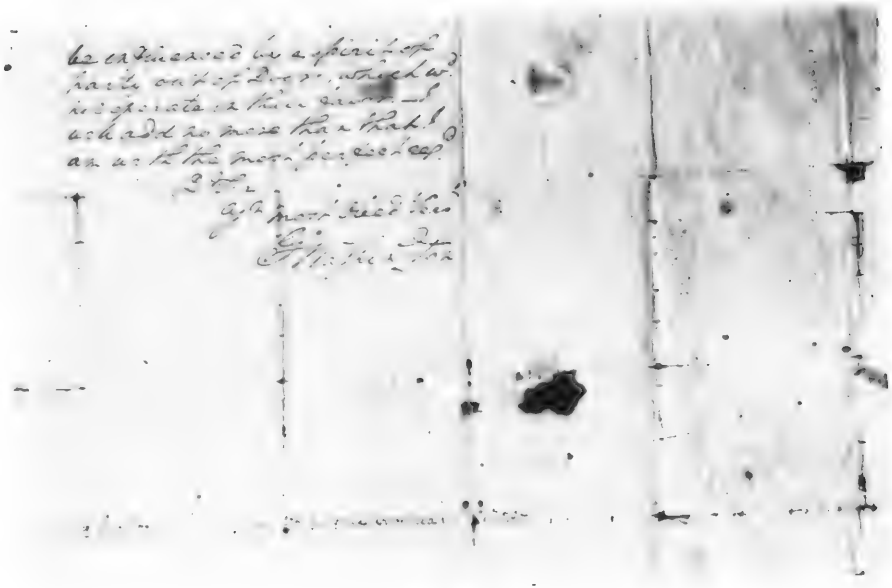


FIG. 2a.

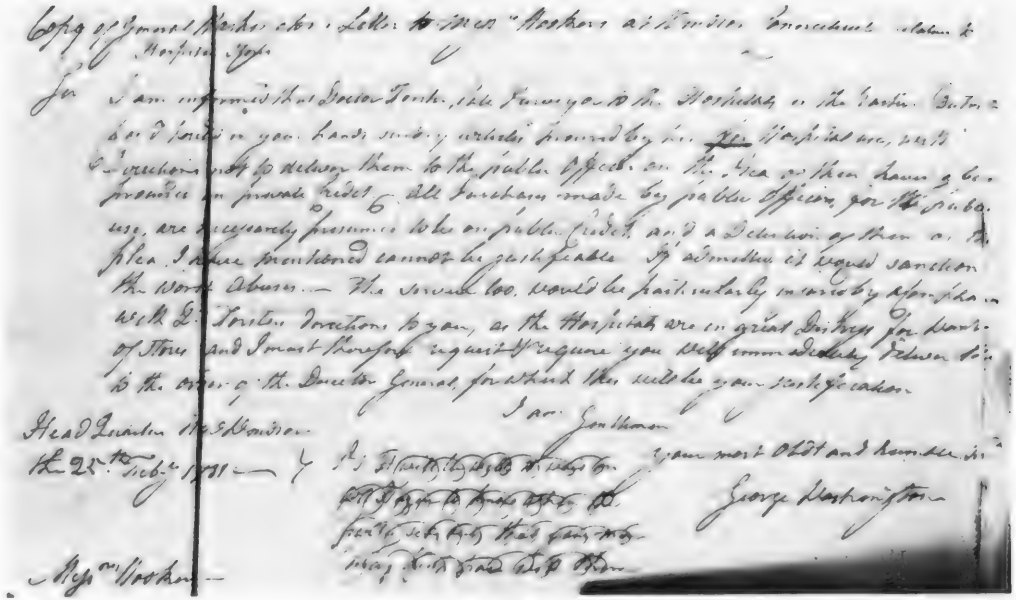


Fig. 3.

Copy * of General Washington's Letter to Messrs Hooker, at Windsor, Connecticut, Relative to Hospital Stores.

Sir I am informed that Doctor Forster, late purveyor to the Hospitals in the Eastern District has deposited in your hands sundry Articles, procured by him for Hospital use, with Directions not to deliver them to the public Officer on the Plea of their having been procured on private Credit. All purchases made by public officers for the public use are necessarily presumed to be on public Credit, and the detention of them on the plea I have mentioned cannot be justifiable. If admitted it would sanction the worst Abuses. The service too, would be particularly injured by a compliance with Dr. Forster's directions to you, as the hospitals are in great Distress for want of stores, and I must therefore request and require you will immediately deliver to the order of the Director General, for which this will be your justification

I am
Gentlemen
Your most Obdt and humble Servt
George Washington

Messrs. Hooker
the 25th Febry 1781
Headquarters New Windsor

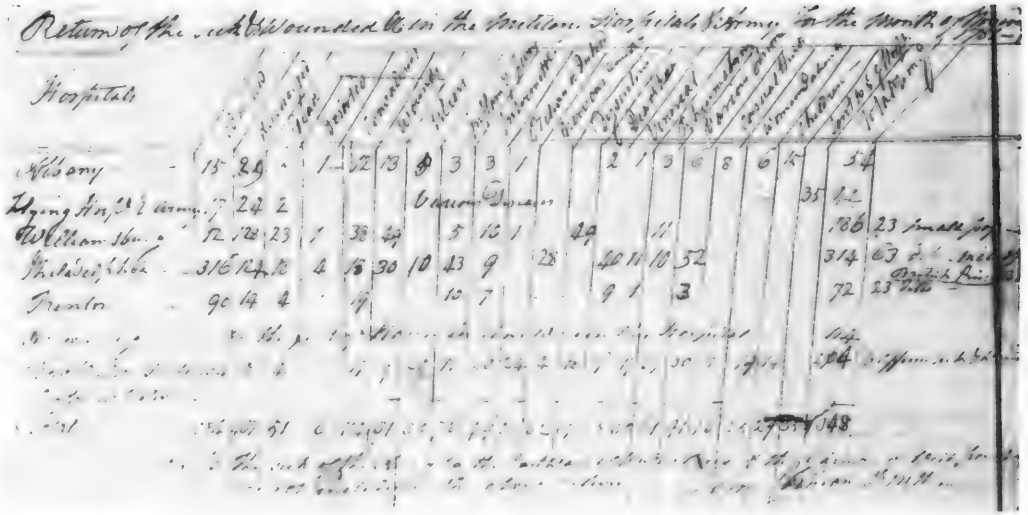
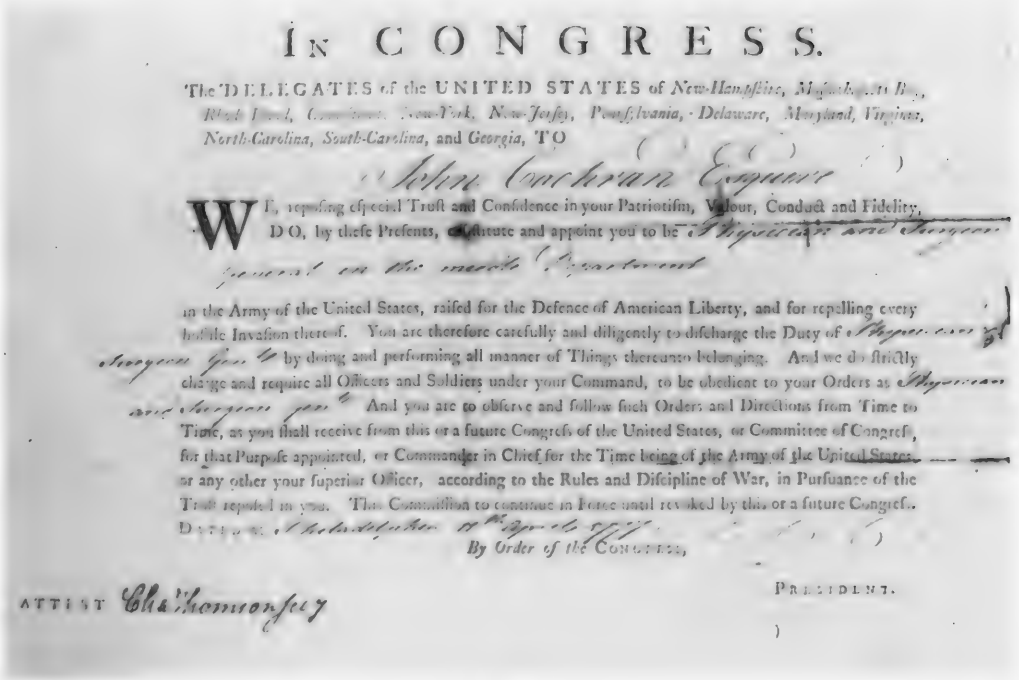


Fig. 4.

Typical page showing Return of the sick and Wounded in the Military Hospitals and Army. For the month of November 1781, with Dr. Cochran's signature.



IN CONGRESS.

The DELEGATES of the UNITED STATES of *New-Hampshire, Massachusetts Bay, Rhode Island, Connecticut, New-York, New-Jersey, Pennsylvania, Delaware, Maryland, Virginia, North-Carolina, South-Carolina,* and *Georgia,* TO

John Cochran Esquire

WE, reposing especial Trust and Confidence in your Patriotism, Valour, Conduct and Fidelity, DO, by these Presents, constitute and appoint you to be *Physician and Surgeon general in the middle Department*

in the Army of the United States, raised for the Defence of American Liberty, and for repelling every hostile Invasion thereof. You are therefore carefully and diligently to discharge the Duty of *Physician and Surgeon gen.l* by doing and performing all manner of Things thereunto belonging. And we do strictly charge and require all Officers and Soldiers under your Command, to be obedient to your Orders as *Physician and Surgeon gen.l* And you are to observe and follow such Orders and Directions from Time to Time, as you shall receive from this or a future Congress of the United States, or Committee of Congress, for that Purpose appointed, or Commander in Chief for the Time being of the Army of the United States, or any other your superior Officer, according to the Rules and Discipline of War, in Pursuance of the Trust reposed in you. This Commission to continue in Force until revoked by this or a future Congress.

DATED at *Philadelphia the 11th day of April*

By Order of the CONGRESS,

ATTEST *Chas Thomson Secy*

PRESIDENT.

FIG. 5.

Commission issued by the Congress appointing Doctor Cochran Physician and Surgeon General in the Middle Department. Dated at Philadelphia 11th April 1777.

Photographed from the original now in possession of the g. g. grandchildren of Dr. Cochran.

THE TEACHING OF MEDICAL HISTORY IN THE USSR

P. ZABLUDOVSKI *

The extension of the curriculum of our medical schools from a five-year to a six-year course calls for reorganization of the contents of instruction. It is impossible, however, to limit oneself to a mere quantitative extension of the program, because the qualitative aspect is considerably more important. We must constantly keep the basic target in view, namely, to raise the medical, and very closely connected with this, the general cultural standard of the Soviet physician. It is quite natural that the history of medicine should occur to us, a discipline that must be introduced into the six-year study plan as a required subject.

The lack of historical preparation undoubtedly constitutes a great gap in our higher medical education and lowers the general cultural standard of the physician. It is impossible to overlook these facts when we find that students of the graduating class at their state examination, even in metropolitan universities, have only a very vague notion of such great scientists as Sechenov, Mechnikov, and Erismann, not to mention their complete lack of knowledge of the medicine of the more remote past.

The time has come to fill this serious gap, for without a thorough knowledge of the past, without awareness in concrete historical terms of the preceding development, it is impossible to understand fully either contemporary problems or developments arising from the new and often changing demands.

For a number of years the reports of the chairmen of the State Examining Commissions have stressed convincingly the necessity of introducing the teaching of medical history into our medical schools. Occasional lectures on the history of medicine delivered at Omsk, Kazan, and other cities have aroused a great interest among students, and this clearly indicates that the time has come for the official introduction of this new subject. This, however, presents considerable difficulties. Not only are textbooks, visual aids, and methodical experience lacking, there is first of all a lack of teaching personnel. Until recently the history of medicine was cultivated

* Translated by Nora B. Sigerist from МЕДИЦИНСКИЙ РАБОТНИК, March 21, 1946.

only in a few, chiefly metropolitan, universities, and then only as an optional subject.

The talk now goes that with the development of the six-year study course in our medical schools medical history will, without fail, be introduced into the curriculum. During the last two years a special commission of the Division on Medical Schools of the VKVSh has done considerable preparatory work as regards the teaching of the history of medicine. In place of a vague program of teaching (17 to 18 lectures, 34 to 36 class hours), organized and methodical instruction will be given.

Some time ago a ten-day course on the history of medicine was given at the Central Institute for Postgraduate Medical Instruction with the goal to summarize the preparatory work, to exchange experience, and to discuss practical problems. Two special problems confronted the scientists and educators assembled for this course, namely, how to formulate a program of instruction of the new discipline and how to organize research in the field. In spite of difficulties instruction in medical history has been offered successfully in medical schools, particularly in some of the Constituent Republics. Thus in Armenia L. A. Oganesyan, Active Member of the Academy of Medical Sciences of the USSR, has for many years taught the history of medicine of his people. His works are a valuable contribution to the general history of culture. The Medical Faculty of the University of Riga has a beautiful museum of the history of medicine created by the initiative and energy of P. I. Stradin, Corresponding Member of the Academy of Medical Sciences of the USSR. The museum serves as an invaluable center for instruction, as well as a center of research in local folk medicine.

Professor G. A. Batkis, Chairman of the Commission on Medical History and Corresponding Member of the Academy of Medical Sciences of the USSR, presented a report in which he informed us that about 15 medical schools of the country already are introducing the study of this new subject. Among the instructors are professors of the most varied specialties such as surgeons, anatomists, hygienists, and internists. The creation of a professional medical historian is a thing of the future.

The most important task of these new chairs is to advance the basic general education of the student. It is necessary to give the future physician some minimum knowledge in the fields of literature, art, general history, and history of philosophy. Only then and only on such grounds will the study of medical history produce the desired result. It is important to encourage these studies by external means such as embellishing study rooms and dormitories with temporary exhibits and portraits of the

great men of the past, and exhibiting copies of new books—all this is of great cultural and educational value.

The historical education of the student should not be confined to the chairs of the history of medicine. All chairs can and must pay serious attention to the history of their specialty, connecting it with their given branch of science such as anatomy, physiology, surgery, internal medicine, obstetrics, psychiatry, and so on.

The participants of the ten-day course were particularly interested by reports presented on the teaching of the history of older Russian medicine (Professor D. M. Rossisky) and of the protection of health in the Soviet period (M. I. Barsukov). Here above all the need for literature and methodical material was felt. There are a number of problems of the medicine of primitive society on which more light has been thrown, but their treatment,—especially in foreign literature—often suffers from distortions. I. D. Strashun, Active Member of the Academy of Medical Sciences of the USSR, disclosed the false conceptions encountered and thus helped to further a true understanding.

The Academicians V. N. Ternovski and K. M. Bykov threw much light on the Renaissance, an important epoch in the development of scientific medicine, one which according to Engels' definition, " was in need of titans and gave birth to titans." The reports impressed the audience with the activities and greatness of the two revolutionists of science—Vesalius and Harvey.

Academician Strashun gave a report concerning a coordinated program of research in the field of medical history and pointed out that it is the duty of the historians of medicine to help in every way in the philosophical and ethical preparation of the physician. The participants of the ten-day course were extremely interested in the papers that discussed the great, but often forgotten or underestimated, scientific achievements of native researchers. Thus the pneumothorax operation was discovered and described about 100 years ago by a modest Russian army physician who remained unknown. Similar treatment was accorded to the labors of Polotebnov and Manasseyin (in the 'seventies of the past century) concerning the action of green mold (Penicillium glaucum) in skin diseases. At that time our scientists stood on the threshold of the now famous discovery of penicillin. To unveil and follow up the great but obscure researches of the past — that also is one of the important tasks of the historian.

Tremendously significant are the relations of our scientists with local and regional organizations, societies, museums, institutes, the study of

archive data, the leading of expeditions, conferences, especially in connection with historical and other factors.

The Academy of Medical Sciences of the USSR, into which the Institute of Public Health and History of Medicine enters, has started a large and complex study of national medical science, calculated for many years. Individual problems are investigated on the spot. Professor D. N. Lukashevich, Major-General in the Medical Corps, informed us about the activities of the Military Medical Academy with regard to the history of military medicine. Professor Jacobson (Ivanovo) dealt with materials concerning the study of the history of Russian social medicine and of surgery in particular, as well as with the Pirogov conferences, special Russian publications, etc. The development of higher medical education in Russia was thoroughly elucidated by Professor K. V. Maistrakh.

The participants of the ten-day course worked out proposals for the publication of textbooks and methodical materials. The publication of an album-atlas, slides, posters, and portraits are a necessity.

This ten-day course has been the successful demonstration of post-graduate instruction in a new scientific field, one that possesses all the conditions for a rapid development. The new generation of Soviet physicians, equipped with the knowledge of history, will be able to raise the standard of medicine in our country to a still higher level.

ANNOUNCEMENTS

CONSTITUENT SOCIETIES

Walter Jarvis Bralow Society for the History of Medicine, Los Angeles, Calif.

On April 4, 1946 the annual George Dock Lecture was given at a joint meeting of the Society with the Los Angeles County Medical Association. Dr. Donald I. Frick of Los Angeles spoke on "Carlos Finlay and Yellow Yever."

NATIONAL NEWS

Army Medical Library, Cleveland Branch.

In conjunction with the fifty-ninth session of the American Association of Anatomists which was held at Western Reserve University School of Medicine on April 4-6, 1946, there was an exhibit of anatomical illustrations from the Middle Ages to the 19th century. It was prepared by members of the staff of the Historical Division of the Army Medical Library. A facsimile of the praying skeleton of Gamelin (1779) was made for the occasion and distributed to the members of the Association.

The Archibald Church Library of the Northwestern University Medical School.

In commemoration of the one hundredth anniversary of William Thomas Green Morton's first public demonstration of ether anesthesia, the Archibald Church Library of the Northwestern University Medical School has prepared an exhibition on the history of anesthesia. The exhibit covers the period from Priestley's discovery of nitrous oxide in 1772 to Morton's epoch-making demonstration at Massachusetts General Hospital on October 16, 1846.

Items of historical interest on display include the original works of Joseph Priestley, Michael Faraday, Crawford W. Long; Dr. Henry J. Bigelow's account of Morton's demonstration in the *Boston Medical and Surgical Journal* for 1846; manuscript letter of Senator Truman Smith (champion of Horace Wells in the ether controversy) to Dr. N. S. Davis, founder of the Northwestern University Medical School; the Ether Controversy number of the *Boston Medical and Surgical Journal* which was published as a supplement to the October 6, 1852 issue and the *Boston Medical and Surgical Journal*, December 2, 1846, containing Morton's notice on the back advertising sheet entitled "To Surgeons and Physicians."

NEWS FROM ABROAD

Wellcome Historical Medical Museum, London.

Dr. E. Ashworth Underwood, the Director of the Wellcome Historical Medical Museum, 183/193 Euston Road, London, N. W. 1. asks us to announce that a catalogue of the extensive library of the museum is being prepared, but that it will be some time before this work will be published. Meanwhile, if any person who is preparing a bibliography of the works of any writer in the field of medicine or the allied sciences, desires to include the location of known copies of the different works, Dr. Underwood will be pleased to send him on request a list of the various works and separate editions of that writer which are in the library of the Wellcome Historical Medical Museum, and applications should be made to him in writing. It is hoped to open the library for the use of students at an early date, and an announcement will be made to that effect, but meanwhile the above particulars will be supplied on request.

BOOK REVIEWS

EDWARD H. HUME. *Doctors East, Doctors West.* New York: W. W. Norton & Company, 1946. 278 pp. $3.00.

"Only those can enter effectively into her life who approach China's citadel by the way of friendship." This is the closing sentence of Dr. Hume's book about his life-work in China. It is obvious, however, that this conclusion was not drawn as a summary or afterthought after his final departure from the East, but that his very first approach to China had been that of friendship. Love and understanding for the Orient and its people were innate in Dr. Hume, who was born in India where his parents and grandparents had lived, taught and done missionary work, and where he too had intended to spend his life as a doctor. But when called upon to start a medical center in Changsha, in central China, for the Yale University Mission, with the eventual prospect of launching a university medical school, his attachment to India gave way to the anticipation of the great task that lay ahead.

This anticipation did not change into too severe an apprehension when, in 1905, on his slow voyage to Hunan province he saw indications of intense dislike of foreigners among the people of the province, and especially the gentry of its capital, Changsha. While still on the boat Dr. Hume learned the political and historical causes for this hatred, and he realized he could dispel it only by means of utmost patience and by mastering the basic tool of understanding and being understood: the Chinese language. Hence, with a teacher, he withdrew into the mountains and after one year he was not only able to converse in Chinese but had also mastered the complicated phraseology of polite intercourse.

Only then could he begin to get his work under way. Yet he was still far from being able to open a medical school. Beofre teaching Western medicine to the Chinese it was imperative that they should first realize its value, for up to that time they had felt quite safe in the care of their own doctors who diagnosed, treated—and frequently cured—their patients according to the precepts of the ancient Chinese physicians. Chang Chung-ching's treatise on typhoid fever, Wang Shu-ho's doctrine of the pulses were undisputed authorities, as they had been for more than fifteen centuries. There were even less scientific "rivals" to contend with: "The Red-haired General"—a cannon credited with the power of bestowing fertility upon Changsha's childless women—the fortuneteller, the soothsayer, and the astrologer who forecast the course of illness; they all had a traditional hold upon the sick and their worried relatives.

We can only admire Dr. Hume for his endless patience and for his ability to penetrate deeply into the motivations of the Chinese mind. He had the wisdom to subject himself to the customs of China, and although he sometimes did not at first understand them he followed them. Just as he adapted his personal life to that of his Chinese neighbors he adapted his medical methods to those prevalent in China: he followed the Chinese ways of examination, studying at great length the pulses of both wrists; he tried to make his treatment conform to accepted Chinese tradition; and he permitted his patients to wear colors other than white, for white

was the color of mourning. He realized the importance for the Chinese of observing religiously the rule that death should occur in one's own home, and during the first two years of the existence of the modest "Yali" Hospital he managed to prevent the occurrence of any deaths on its premises. It took about the same length of time before he could venture to perform major surgery upon the Chinese, who valued the intactness of their bodies more than life itself.

Yet in spite of his conformity to customs, which often were a direct contradiction to the teachings which he had received at Johns Hopkins, there is never a trace of condescension in his writing. He was aware that in the eyes of the Chinese his ways were exotic and that he could win their confidence only by submission to what they valued. Hence it is not surprising that his modesty, his sincere respect for Chinese culture, and his ability to fit himself completely into the life of China won him eventually the friendship of even the formerly hostile gentry. Meanwhile Dr. Hume's medical work gained steadily in recognition; there was an increase in the number of surgical patients and he was even from time to time called upon to perform a particularly difficult delivery, a task which had hitherto been the exclusive prerogative of midwives.

The modest little inn, which had been converted into the Yali Hospital and which, since 1911, housed the first school of nursing in Hunan, grew much too small to accommodate the increasing number of patients. Thus it was with great happiness that Dr. Hume returned from his first furlough in America with a gift from his Yale classmate, Edward S. Harkness, which provided the funds for a greatly enlarged hospital and medical school, to be run co-operatively by the newly founded Chinese Society for the Promotion of Medical Education and by the Yale University Mission. This gift finally enabled Dr. Hume to realize his dream of opening a university medical school whose head he remained until 1928. At that time the flourishing Hsiangya (Hsiang, the literary name of Hunan and Ya for Yale) Medical College had, in the estimation of the Yale University Mission, accomplished its purpose and it became a Chinese national institution.

Dr. Hume's serene book is more than an autobiography of his years in Changsha—it is full of sidelights upon the cultural and political history of Hunan province during the turbulent period of China's pre-revolutionary days, the abolition of the Manchu empire, the years of the war-lords, and the beginning of the Kuomintang under Chiang Kai-shek's leadership. On many occasions the author was drawn personally into China's political upheaval. He himself was neither a "Doctor East" nor a "Doctor West" but an intensely tolerant physician with the ardent wish of presenting the gift of health to a people whom he loved and admired. He truly followed one of the many Chinese proverbs which, in superb calligraphy, head his chapters: "When you enter a new neighborhood, ask what is forbidden; when you enter a country, ask about the customs." Of Dr. Hume's book it may finally be said that everyone, doctor or layman, will find it interesting; but that doctors contemplating going to China—or indeed any foreign country—will find it an indispensable guide to achievement.

ILZA VEITH.

MAXWELL MALTZ. *Evolution of Plastic Surgery.* New York: Froben Press, 1946. 368 pp. 108 ill. $5.00.

Dr. Maltz has written a history which purports to "trace the evolution of reparative surgery (and in especial of rhinoplasty) as an art and a science." Beginning with references to primitive surgery he chronologically presents the contributions of India, Egypt, Assyria, Greece, Rome, Arabia, the Middle Ages, and subsequent centuries down to the present. To accomplish such an ambitious program in the brief span of 294 pages one must perforce be highly selective in the material to be included and, in order to keep the reader from bumping from peak to peak, must skillfully interpret and synthesize the facts presented. Unfortunately Dr. Maltz does not always meet these requirements. For example, in the first chapter, "Bellona," much space is devoted to a discussion of modes of warfare, but little attempt is made to correlate the changes in the types of wounds with the changes in the types of warfare. In the second chapter mutilations are considered in detail with no other justification or explanation than, "Human material for reparative surgery was consequently vast and the experience gained thereby was equally so." Later the "Greek Esthete and the Human Face and Form" are discussed, with no effort to place them in their proper niches in the evolution of the art of plastic surgery. In the chapter on Roman surgery there are two pages of nothing but names of durgs used in the treatment of wounds. In another chapter the historical aspects of anesthesia are very inadequately presented; in the section on local anesthesia Halsted and Cushing are not mentioned. One might well ask why a history of anesthesia was included at all, however brief. There is also a discussion of the introduction of antisepsis. Would it not have been more to the point to discuss only the influence of the practice upon plastic surgery and to leave any consideration of its historical development to the general histories of surgery where it more properly belongs? Again in subsequent chapters we are confronted with many innovations and innovators undoubtedly important in the development of the art and science of plastic surgery, but Dr. Maltz does not adequately guide us through the maze. Perhaps less space devoted to techinique and more to interpretation would have been profitable.

The illustrations for the most part are poorly reproduced and have little bearing on the text. For example, in the chapter on mutilations there are three illustrations showing mutilation of the female breast, but no reference is made to this practice in the text. Following the last chapter is a thirty-two page section of "before and after" pictures of patients who have undergone plastic surgery of various types. A single series of illustrations depicting the steps in the reconstruction of a nose or an ear would have been more pertinent.

Preceding the index is a "unique Chronology of the Evolution of Plastic Surgery." In recent years chronological tables of all types have become very popular. To appraise such a table critically, every entry should be carefully checked, but the reviewer has neither the time nor the inclination to do so. A brief perusal, however, discloses numerous inconsistencies; for example, for many subjects there are two entries, author and subject. For Lister, however, there is no entry under 1867, the year of publication of his first articles on antisepsis. Pasteur is not listed at all. Gustav Simon is listed for his plastic repair of vesico-vaginal fistula while

Sims is omitted. Domagk is included for the introduction of "Chemotherapy" but Fleming and Florey are omitted. Maltz is listed six times.

The book has more than its share of errors, typographical and otherwise. There is no bibliography, and the very few references included in the text are incomplete. The reader is left in the dark as to the sources of various documents, such as those quoted in the discussion of Tagliacozzi; here the author seems to be indebted to the original researches of Martha T. Gnudi and Jerome P. Webster in their compilation, *Documenti inediti intorno alla vita di Gaspare Tagliacozzi* (Bologna, 1935). The index is also inadequate.

The publisher makes the rather extravagant claim that this book is the "first history of plastic surgery in any language." It is hard to consider seriously a book on this subject which completely overlooks Eduard Zeis's *Die Literatur und Geschichte der plastischen Chirurgie*, Leipzig, 1863.

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